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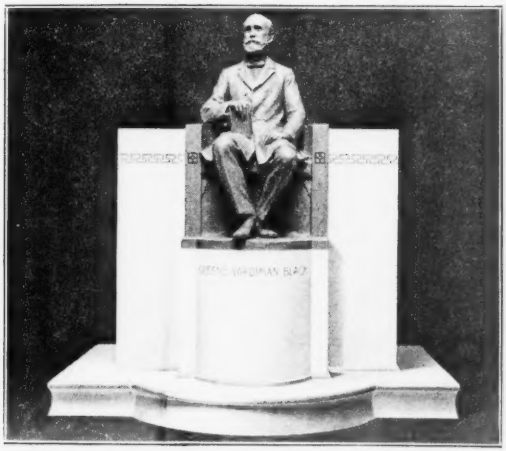


Black Memorial, Lincoln Park, Chicago.
Unveiling August 5-9, 1918.

60 Years Organized Dentistry—*Frontispieces.*

CONTENTS

Page

Presidents of the American Dental Association.—Presidents of the Southern Dental Association.—Presidents of the National Dental Association.....Frontispieces

ORIGINAL COMMUNICATIONS.

Simple, yet Effective Means for Making Attachment to Teeth with Vital Pulps for Removable Bridges and Partial Plates.
By G. Walter Dittmar, D. D. S..... 673

The Dentist and the Clinic for Speech Defects.
By James Sonnett Greene, M. D..... 682

The Teaching of Conductive Anesthesia.
By Theodor Blum, D. D. S., M. D..... 693

The War Duties and Opportunities of Dental Schools.
By H. E. Friesell, B. S., D. D. S..... 702

THE RESEARCH DEPARTMENT.

Progress of the Year in the Investigation of Mottled Enamel with Special Reference to Its Association with Artesian Water.
By Frederick S. McKay, D. D. S..... 721

EDITORIAL DEPARTMENT.

The Memorial to G. V. Black..... 751
Serum, Antitoxin, Vaccine, Virus..... 753
The Canadian Dental Association in Chicago..... 755
You can Help Win the War!—An Appeal for Prompt Individual Service by Every Member..... 756

ARMY AND NAVY.

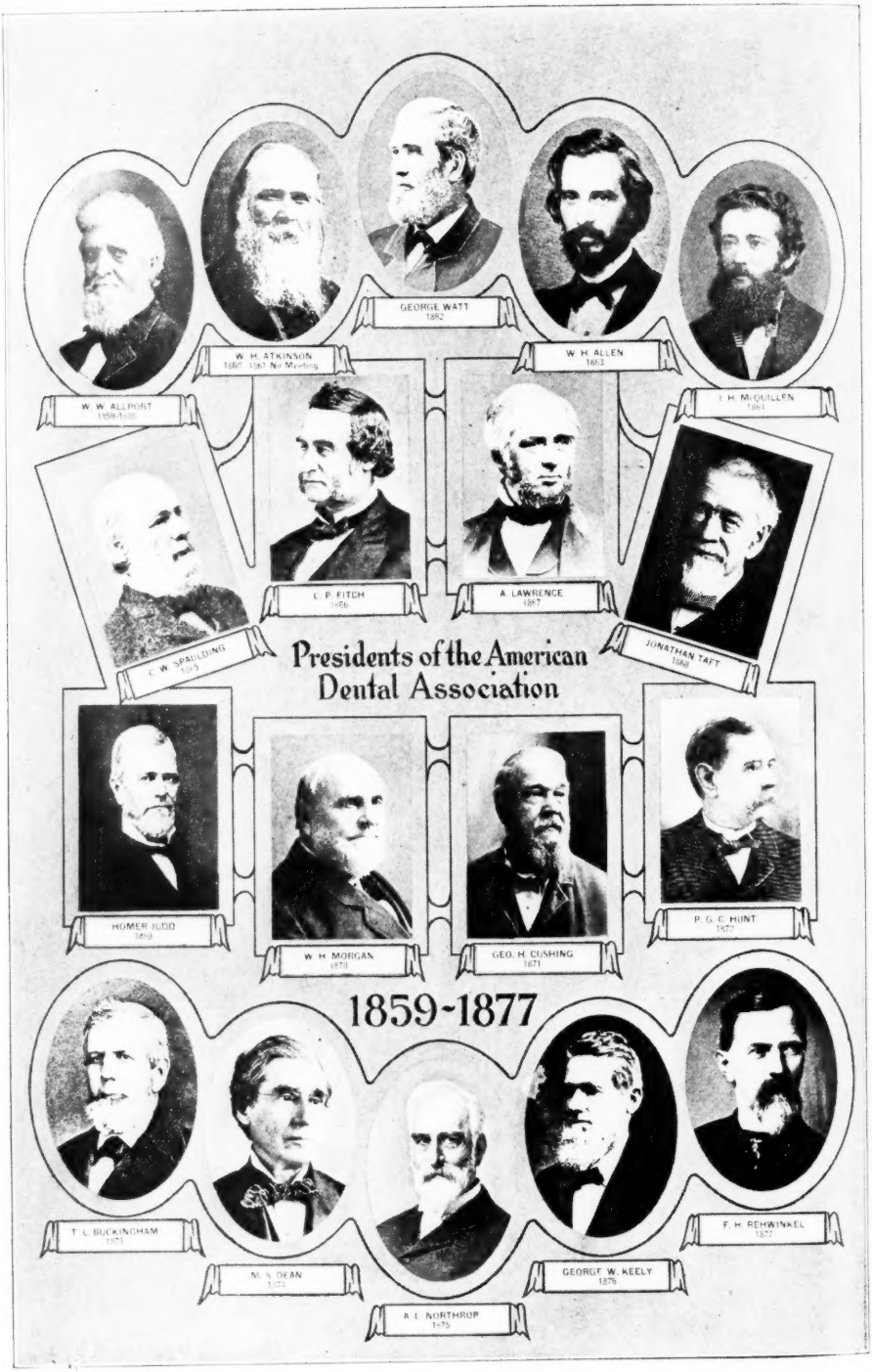
The Dental Corps.—Our Responsibility.
By Dr. E. P. R. Ryan..... 758
Hearing of Secretary Daniels..... 760
Enough Army Dentists..... 761
General Gorgas and the Surgeon Generalcy..... 761
Dental Corps Orders from War Department..... 762

PREPAREDNESS LEAGUE.

Letter from Chas. F. Ash..... 763
Preparedness League of American Dentists.—Tabulated Reports..... 764
Preparedness League of American Dentists.—Notes and News..... 767

ANNOUNCEMENTS.

National and State Societies Meetings.—National Association of Dental Examiners.—Xi Psi Phi Fraternity.—The American Academy of Oral Prophylaxis and Periodontology.—Montana State Dental Society.—Psi Omega Fraternity.—Notice.—National Association of Dental Examiners.—Dentists' Mutual Protective Alliance.—The Taggart Case not Settled.....769-772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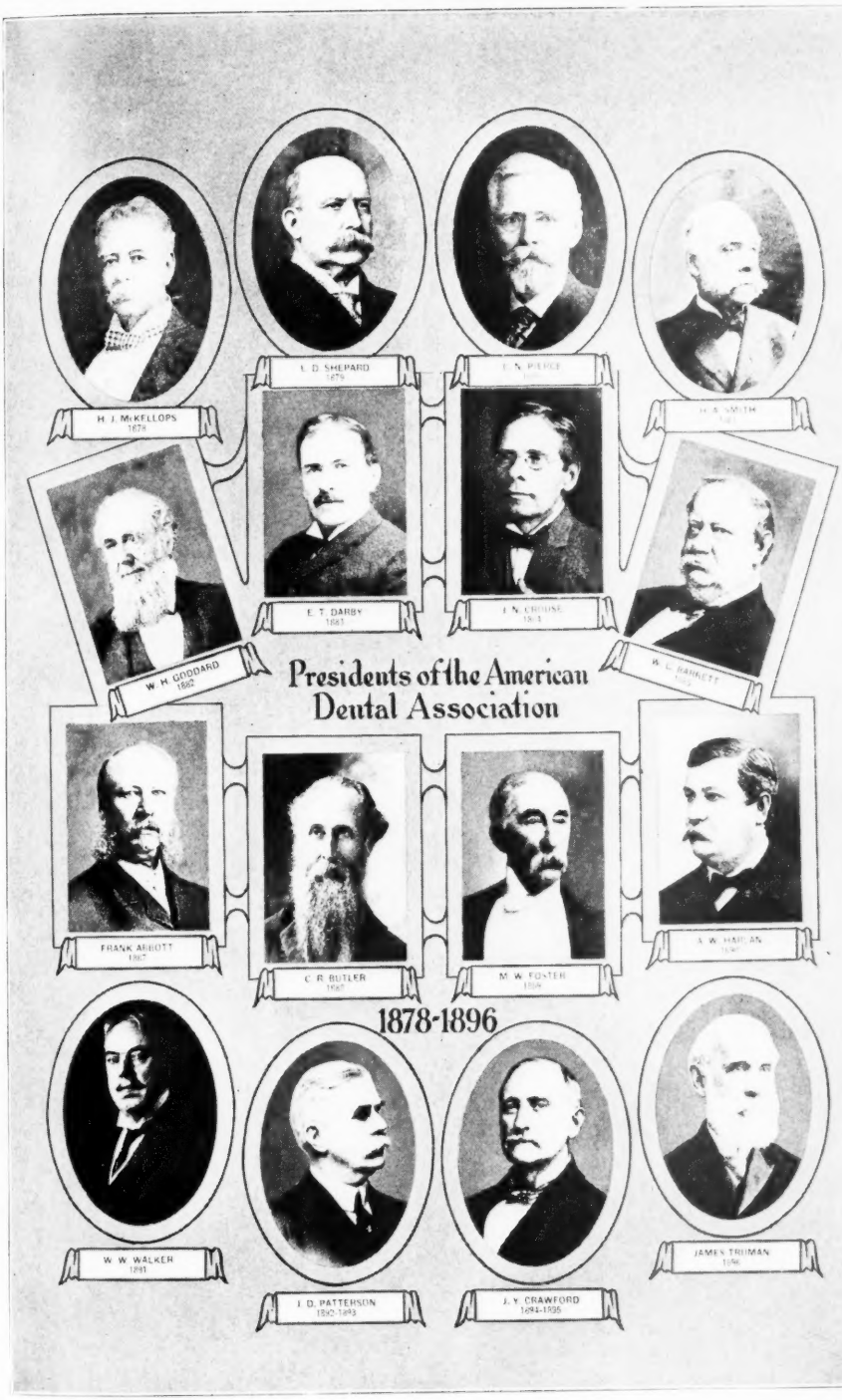
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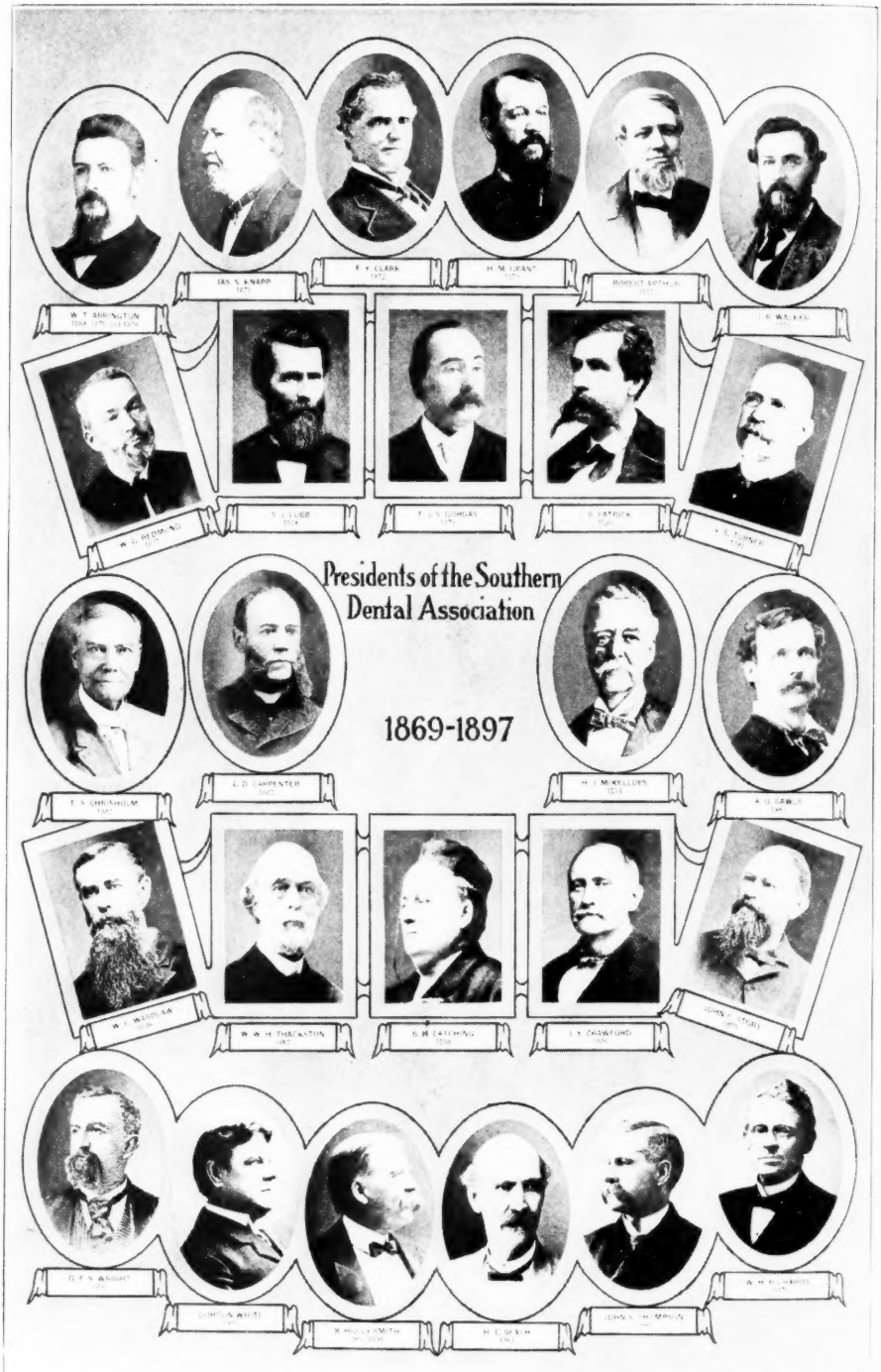
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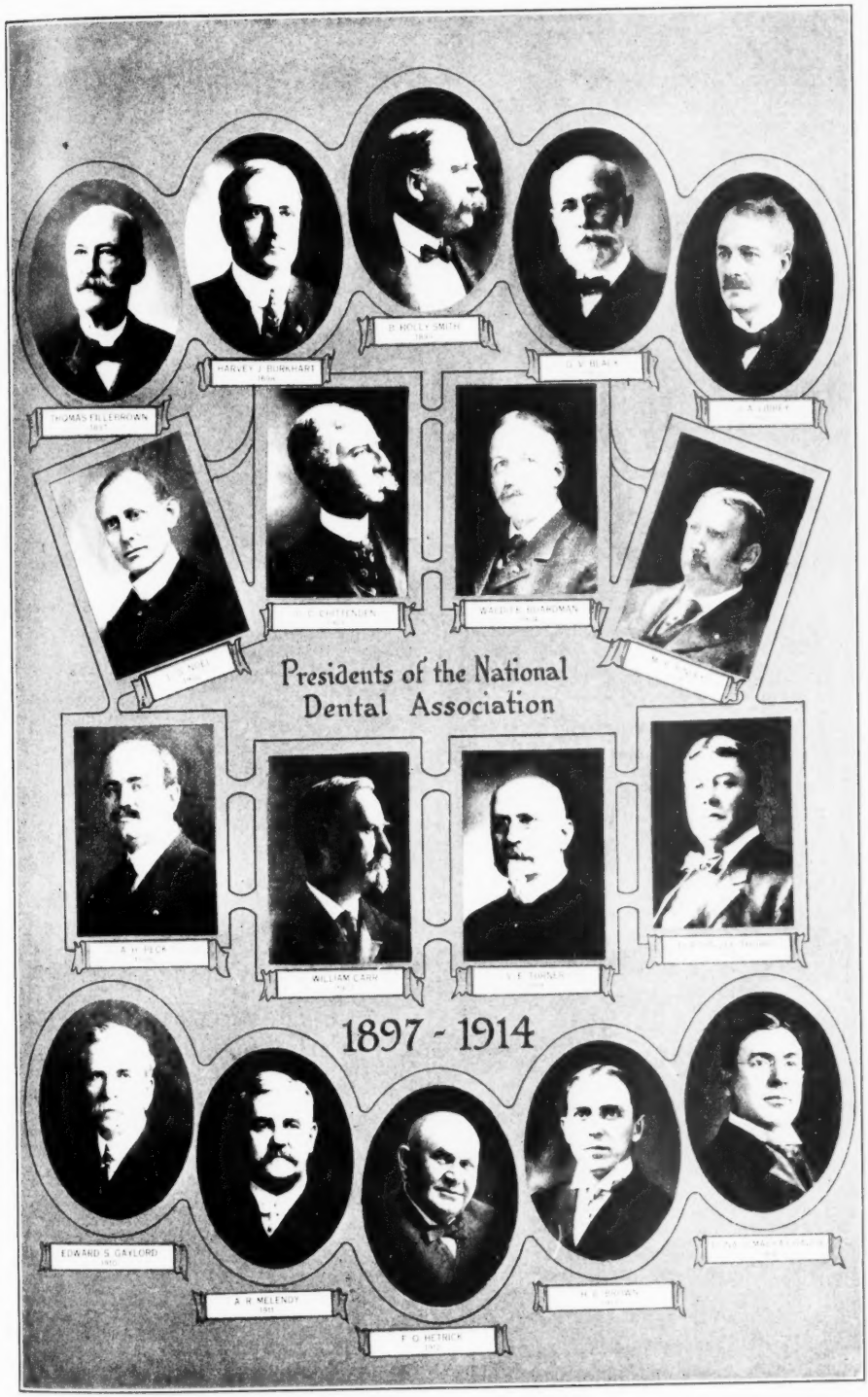
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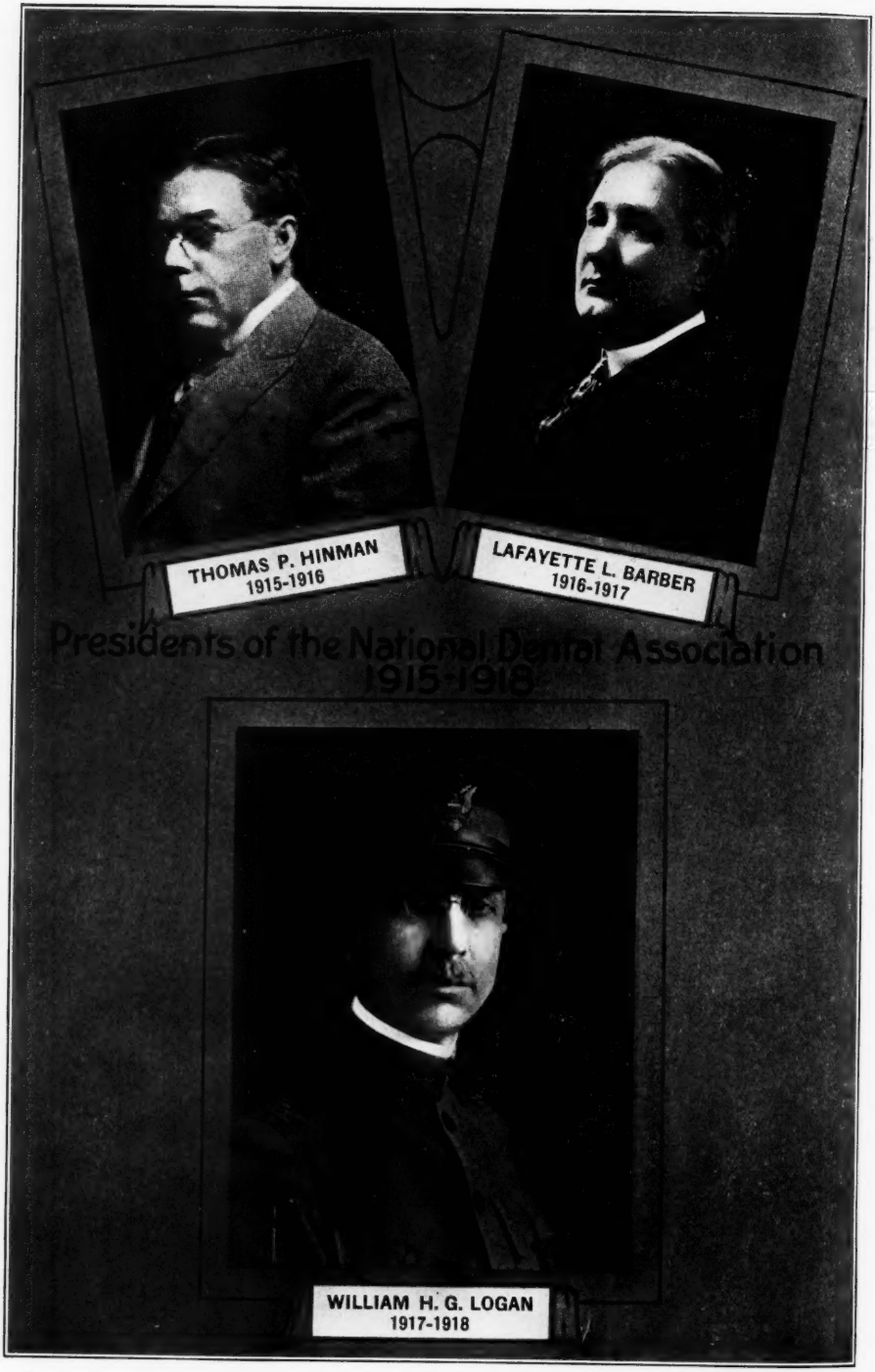
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VOL. 5 JULY, 1918 NO. 7

Original Communications.

SIMPLE, YET EFFECTIVE MEANS FOR MAKING ATTACHMENT TO TEETH WITH VITAL PULPS, FOR REMOVABLE BRIDGES AND PARTIAL PLATES.

By G. Walter Dittmar, D. D. S., Chicago, Illinois.

(Read before the National Dental Association at Its Twenty-first Annual Session, New York City, N. Y., October 23-26, 1917.)

IN THE limited time allotted me, it will be impossible to give attention to other than principles and go briefly into the technic of construction of but two forms of tenso-friction appliances used as attachments to teeth with vital pulps.

In the various text books on prosthetic dentistry and in the numerous dental journals all of the imaginable forms of attachment appliances, operating by friction produced by tension, have been described and more or less definitely illustrated.

Perhaps the most comprehensive expose of the subject is that which was presented to the Illinois State Dental Society in 1915, and also in 1917, by Dr. Chas. W. Coltrin, of Chicago. These articles are published in the proceedings of the Illinois State Dental Society and also in the Dental Review October, 1915, and September, 1917, and are worthy of careful reading, for they described practically all of the patented forms of attachments and the various forms of clasps used by dentists.

Before considering the mechanical phase of the two forms of attachments alluded to, permit me to call attention to at least three fundamental questions that every prosthetist should have in mind when a case presents requiring some form of attachment.

The first is—How can the tenso-friction appliance be constructed so that it and the partial denture will do the least possible harm to the peridental membrane and other supporting tissues of the tooth, to which anchorage is made?

The second is—How can it be constructed that it will produce the least possible harm to the enamel and other hard tooth tissues thru wear and promotion of conditions which may produce caries?

The third is—How can the attachment be constructed so it will securely hold the partial denture in position?

Figures 1, 2, 3, 4, 5.

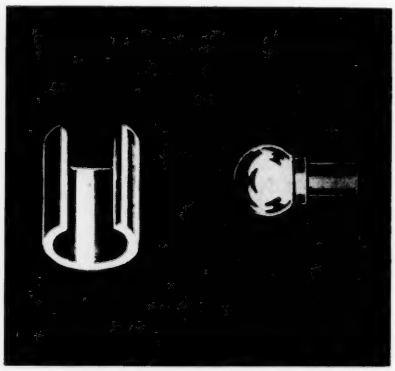


Figure 6.

The latter unfortunately too often seems to be the first and only thought the dentist has in mind; apparently giving no consideration to the serious consequences which so often follow where the wrong type of attachment is used viz., the producing of disease of the hard tissues or of the supporting tissues of the teeth, or both.

I well realize that it is practically impossible to attach to any tooth with the very best form of attachment without some harm resulting to that tooth ultimately, because of the attachment.

The point is—*Use the type or form of attachment that will produce the least possible harm and still give sufficient retention to the partial artificial denture.*

The crying demand of our profession as well as of many of our patients is that more so called removable bridges and partial plates be made and less fixed bridges. Also that we shall make attachment to vital teeth, if the teeth to which attachment must be made are vital and healthy. May I add that as a rule attachment to pulpless teeth is a comparatively simple procedure, tho good judgment and fine skill are demanded to obtain the best results.

In making attachment to vital teeth two methods present themselves: First—the use of some of the patented forms of attachments like the Roach, Gilmore, Morgan, etc., soldered to an inlay or crown, necessitating the mutilation of the tooth.

Second—the attachment made by some form of clasp without mutilation of the tooth.

I will consider first that method which requires mutilation of the tooth to which anchorage is made. A well made, securely anchored inlay (Figure 1) is usually sufficient to hold the attachment for a removable partial denture and where conditions require it, a mesio-occluso-distal inlay, (Figure 2), an onlay, (Figure 3), a pinlay, (Figure 4) or a lingual hood crown (Figure 5) provide most stable anchorage.

Confining my remarks to removable partial dentures, and more in particular to that class where all the posterior teeth are missing and all of the anterior teeth are in position, conditions very frequently found in the lower as well as in the upper, I would select as the best form, the well known Roach attachment invented by Dr. F. E. Roach, of Chicago.

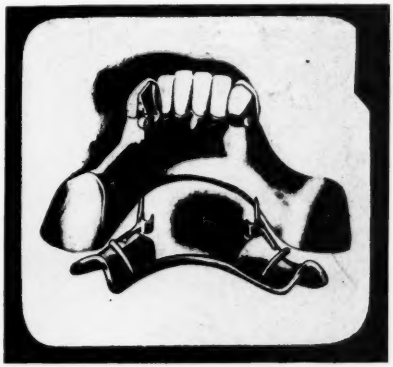
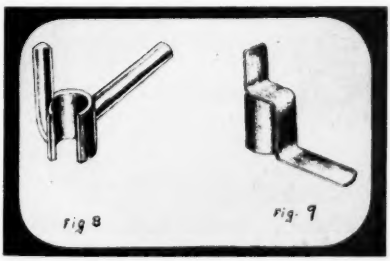


Figure 7.

I would use this attachment because *it produces the least possible strain upon the anchor tooth* or, to be more explicit, the tooth to which anchorage is made.



Figures 8, 9.

There are two forms of this attachment, both operating on the same principle, viz., a ball or button attached to the anchor tooth and a clasp or tube fastened to the removable denture. I will consider first the older form. (Figure 6.)

The button of the Roach attachment should be soldered to the inlay or crown about one thirty-second of an inch from the gum and it is advisable to set it as far lingually as possible, but have it project distally parallel with the alveolar ridge. Not lingually to interfere with the tongue. (Figure 7.) The tube must be modified by soldering to it a clasp metal wire (Figure 8) or strip of plate clasp metal (Figure 9) so bent that one end will act as an anchorage lug which is to be soldered or vulcanized to the removable denture, the other end to act as a contact spur, resting on the proximal surface of the inlay or crown to which anchorage is made. (Figure 10.) The function of this contact spur is to produce "indirect retention." (Figure 11.) The tube griping the button near the

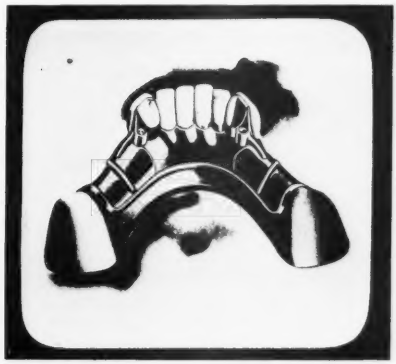


Figure 10.

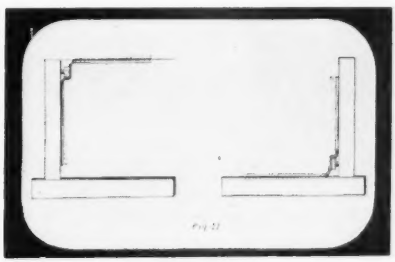


Figure 11.

gingival portion of the tooth and the contact spur bent to make tight contact near the occlusal or incisal portion of the proximal surface of the tooth will cause the saddle or base to lie in contact with the mucous membrane.

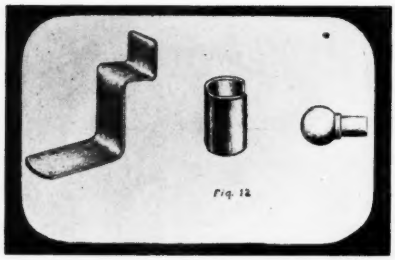


Figure 12.

If plate clasp metal is used for making the contact spur (Figure 12) use not less than twenty-six (26) gauge. Cut a piece about as wide as the diameter of the tube and long enough when bent to fit along

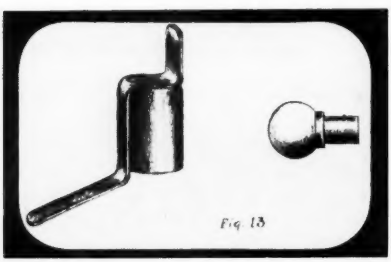


Figure 13.

the back and over the end of the tube; again bending the part which lays over the end almost at right angles away from the tube, cutting it off even with the occlusal or incisal portion of the tooth when the finished clasp is in position.

The other end of the strip have long enough and bent at an angle to reach the metal saddle or extend as an anchorage lug into the vulcanite.

Now slightly flatten the back of the tube (opposite the open part,) with a stone or file. Place anti-flux so the part of the strip which is to fit over the end

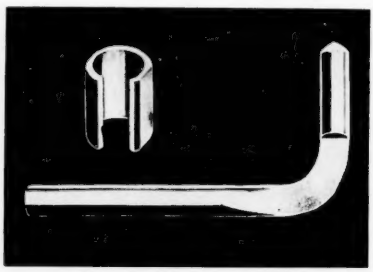


Figure 14.

of the tube will not solder. Then solder the flattened part of the tube to the strip using a minimum of 18 karat gold solder. (Figure 13.) If a 16 gauge clasp metal or elastic wire is used, (Figure 14)

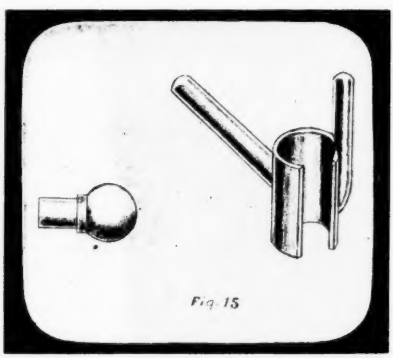


Figure 15.

slightly flatten the tube on one side, also the wire. Solder the wire to the tube, slightly flatten the end of wire and bend to form a contact spur, the other end of the wire to be formed so it will act as an anchorage lug which can be soldered to a metal saddle or attached to the vulcanite. (Figure 15.)

The tube of the new form of the Roach attachment (Figure 16) is so made by the manufacturer that it has the modifications just described, viz., the tube, contact spur and anchorage lug are all made from a single piece of clasp metal. This makes it more compact and decidedly more simple and convenient in its application.

The button of the new form is oval, somewhat like an old fashioned door knob—and is made with a wide flanged flat base instead of the constricted projection which is to be soldered to the

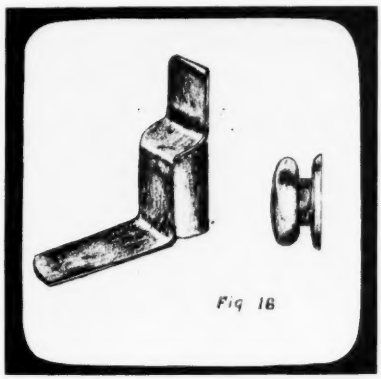


Figure 16.

inlay or crown. This in many cases makes it more convenient for attachment with solder and also because of the comparatively large base makes a more secure union when soldered.

The sames rules which apply in the use of the older form must be observed in the application and use of the new form. As regards the position of attachment to the inlay or crown. The new form, however, affords another very excellent method of using it in those cases where anchorage to a saddle is made at one end only: (Figure 17a.) viz., solder a strip of 26 gauge clasp metal plate to the inlay or crown, setting it as far lingually and gingivally as possible—this strip to be ⅛ of an inch wide and ¼ of an inch long. 1/16 of an inch from the end, bend this strip to an obtuse or nearly a right angle, after it is well annealed. This short part to set flat against the crown or inlay to insure a strong union when soldered—the long part to project parallel with the alveolar ridge and stand with the edge occluso-gingivally. The button to be soldered to the side of this strip, near the end, to project buccally or labially from the strip. By this method the button is placed near the gum and about 1/16 of an inch from the anchor tooth.

The contact spur on the tube must be

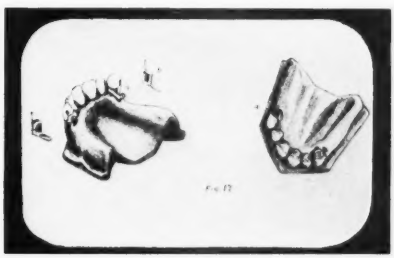


Figure 17.

cut off when the attachment is used in this manner and a new contact spur either of plate or wire soldered to the tube, following the technic described for the older form. (Figure 17 b.)

This is necessary because the contact spur provided on the attachment will not act as a contact spur because the tube is set edgewise or almost at a right angle with the proximal surface of the tooth, therefore a new contact spur must be provided.

Where two or more attachments are used they should of course be set as nearly parallel as possible, but no jig or paralleling device is necessary as absolute parallelism is not needed.

The oval shaped button of the new form, or the speroidal shaped button of

the older form allows the tube sufficient movement under masticating stress to relieve the anchor tooth or teeth of undue strain.

Before closing on this subject I desire to state that I do not consider this the best form of attachment for all cases. Like practically every other good thing it has its limitations and is best suited for the class of cases I have described, viz., where all the molars and some of the bicuspids are missing, or anywhere where the end of the saddle or plate opposite from where attachment is made

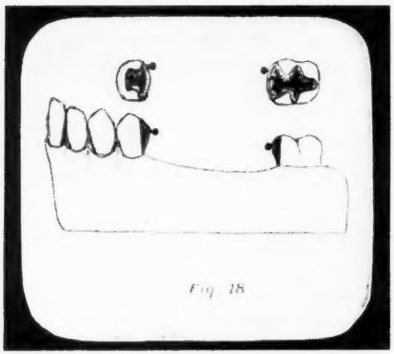


Figure 18.

must be free, because of no natural tooth present to which attachment can be made. Where both ends of the appliance are supported by natural teeth the Roach attachment can be used, but has no special advantage over many other forms with the exception that it allows the artificial denture to settle without undue strain upon the anchor teeth, and that it is in my opinion one of the simplest and strongest of the patented retentive appliances. When it is used where both ends are supported with natural teeth in position, the contact spurs are not necessary. The plain tubes and buttons are sufficient. In such cases the buttons should not be soldered close to the gum line, but rather be set as near the occlusal portion of the teeth and as far lingually as the case will allow without interfering with the tongue. (Figure 18.) Where the artificial tooth next to the attachment is anterior enough to be conspicuous and there is not room enough to place a vulcanite tooth, a Steele facing can be used to advantage by soldering the backing of the Steele tooth to the metal saddle or to the anchor lug of the tube of the attachment and cementing the facing to position after the case is otherwise finished.

Considering now that class of cases where we wish to avoid mutilation of the

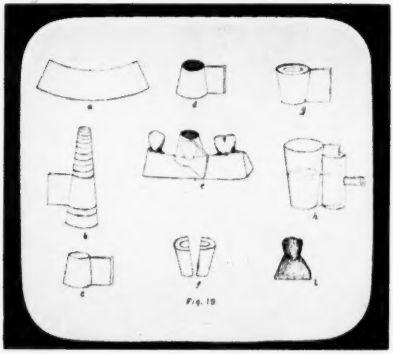


Figure 19.

tooth—where the tooth to which anchorage must be made is perfect. I will briefly describe a new form of clasp also devised by Dr. F. E. Roach, which he terms the mesio-distal grip clasp. As its name implies, it grips the tooth mesio-distally.

For cuspids and incisors it can be made reasonably effective with comparatively little show of metal. It can also be made to operate well on bicuspids and molars. For illustration I will take a cuspid because that type of tooth is usually difficult to clasp to good advantage. (The same general technic, however, is used for making these clasps for the posterior teeth.)

The first requisite is to obtain a good impression of the tooth to be clasped,

either in plaster of paris or modeling compound. If the tooth is isolated, a plaster impression, using the technic described by Dr. Cummer, of Toronto, is an excellent method. (Figure 19.) If

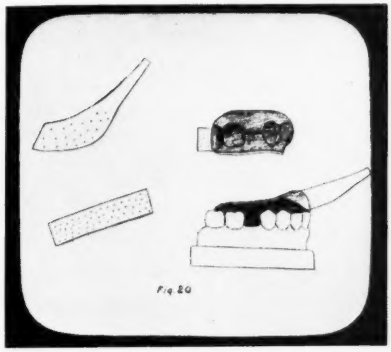


Figure 20.

modeling compound is used the impression must be taken by the sectional or core method. (Figure 20 and Figure 21.)

The cast should be made of some hard material; Melotte's or other fusible metal can be poured into a plaster impression.

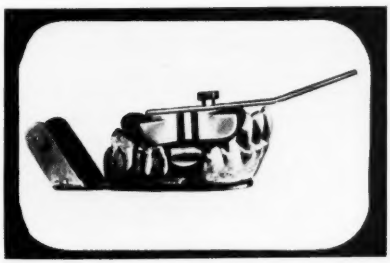


Figure 21.

Copper amalgam, cement, Price's or Weinstein's artificial stone are excellent for making casts in modeling compound impressions. Thus a hard model upon which the clasp can be formed is obtained.

Having a true reproduction of the tooth, place on the lingual surface a piece of pure gold or platinum 36 to 40 gauge and burnish it to position (Figure 22 a)—this to cover about ⅓ of the lingual surface. Now take a round clasp metal or elastic wire 16 to 17 gauge, bend it to a narrow U or hair pin form b; Place it on the mesial side of the tooth so the bent angle will project incisally of the contact point and the two bars extend gingivally, laying in the labial and lingual embrasures. Bend the lingual bar near its end to an obtuse or nearly right angle (c) and slightly

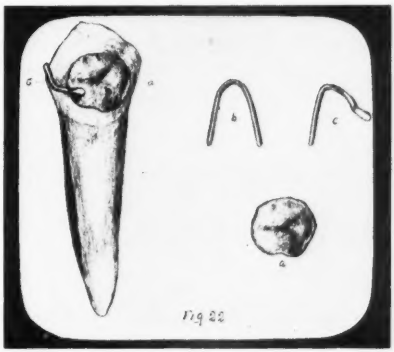


Figure 22.

flatten so it will lay onto the burnished piece of gold or platinum. Then tack it with hard sticky wax. Now remove it from the model, invest and unite with 18 karat solder flowing sufficient solder to stiffen and strengthen the lingual portion. Then replace on the tooth model (Figure 23) and fit another U shaped clasp metal or elastic wire 16 or 17 gauge on the distal, similar to that on the mesial (a); place it in position and tack with hard sticky wax. Now form an anchorage lug (b) by flattening the end of a 14 gauge half round wire about ½ an inch long, and bend it to lay properly over the burnished metal on the lingual of the tooth model, also bend wire so it will extend to the metal sad-

dle to which it can be subsequently soldered, or so it will project into the vulcanite and be securely anchored. Now, slightly heat the flattened end so it will melt into position in the wax on the lingual plate of metal which forms part of the clasp; reinforce well with sticky wax, remove from tooth model, invest and solder, flowing sufficient solder to make a strong rigid union. The two loose bars of the clasp which lay in the mesial and distal labial embrasures are left comparatively loose, not tightly fitted until the partial denture is completed and placed in the patient's mouth, at which time any slight bending or fitting to make the clasp grip well can be accomplished with wire bending pliers. In fact these labial bars should be left reasonably loose while making the clasp, as this facilitates the removal of the parts while constructing the clasp, and also the denture when fitting it to place in the patient's mouth. (Where bicuspids or molars are clasped, the same general plan of construction is followed (Figure 24.) An expert with pliers can make this clasp out of one piece of wire to which is soldered an anchorage lug, but for the average man the technic I described above is much easier and the results usually better.

Figure 23.

Figure 24.

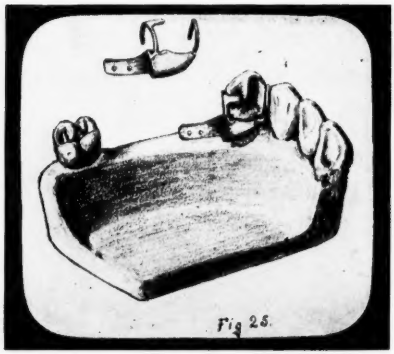


Figure 25.

On the posterior teeth it is often advisable to solder one or two occlusal rests so the clasp will stay in its proper position on the tooth which is clasped. (Figure 25.) An expert may avoid the longer technic of making an accurate model of the tooth by fitting the clasp while constructing it directly on the patient's tooth, but this is not easy especially on the posterior teeth. Frequently it is necessary to cut a slight notch in the mesio or disto-incisal or occlusal angles of the tooth which is clasped or the approximating tooth or else slightly shorten the cusp or cusps of the antagonizing tooth or teeth to allow the wires which hook from the lingual embrasures

to the labial or buccal sufficient room to prevent their interference with occlusion.

Sometimes too, after the case is completed we find that we can dispense with a portion of a labial or buccal bar because the artificial tooth on the denture makes tight contact with the tooth clasped, and the bar in the other embrasure will grip sufficient to retain the appliance. Where this can be done, it is advisable to do so for it thereby prevents the show of extra metal. The end of the bar which lays in the labial or buccal embrasure can, if necessity requires, be modified by soldering to it a narrow strip of 26 gauge clasp plate or 17 gauge wire, so shaped as to fit the gingival part of the clasped tooth, or of the approximating tooth. This will sometimes give extra retention and stability to the appliance.

There is of course this objection to be made to this form of clasp, viz., that it covers considerable of the lingual portion of the enamel and that it forms a rather rigid attachment to the tooth clasped thereby subjecting the tooth to over strain if there is much leverage produced by a large plate or a saddle which is long and unsupported at the other end.

All clasps are more or less objectionable in some manner or other, but for an attachment to a healthy natural tooth in a mouth reasonably immune to caries and where the patient will remove the bridge or plate every night and apply prophylactic measures, it is the best form of clasp attachment known to the writer, especially for the anterior teeth, those which have given us most trouble to clasp well.

These simple, yet effective, retentive appliances allow the greatest possible conservation of tooth structure and vital pulps—the latter especially being a most important factor.

THE DENTIST AND THE CLINIC FOR SPEECH DEFECTS.

By James Sonnett Greene, M. D., Director of the New York Clinic for Speech Defects.

(Read before the National Dental Association at Its Twenty-first Annual Session, New York City, N. Y., October 23-26, 1917.)

IT IS said that a Greek historian while journeying in Egypt about 460 B. C. observed that besides medical doctors there were three (3) classes of surgeons: surgeons of the eye, surgeons of the ear and surgeons of the teeth, in the nomenclature of today dental surgeons.

We naturally must conclude that since there were dentists, there must have been patients.

If a Greek historian would have taken a trip about the time of Moses it is impossible to say whether he would have discovered any defective speech doctors but we are sure that he would have found defective speech patients, for did not Moses say when commanded to go before Pharo: "O my Lord, I am not eloquent, neither heretofore nor since Thou hast spoken to Thy servant, but I am slow of speech and of a slow tongue."

While one could reasonably think with dentistry extending so far back on the dental geneological tree and with defective speech extending still farther back on its own geneological tree that by this time they would both be fully associated with each other on account of the direct relationship which one bears to the other; still we find that there are important factors, which tho being cognizant of and receiving some consideration from both the dentist and the speech specialist, nevertheless have been more or less neglected.

What I wish to do is to bring before you for your special consideration a plea for a more complete understanding and association between our two specialties, defective speech and dentistry.

I believe in the possibility of developing a cooperative relationship between these two sciences in more than one direction.

I believe we should do here as in the dental colleges abroad, that the education of dental students should include a course in physiology of speech and phonetics. After a thoughtful consideration of the subject you will be convinced of the necessity of such a measure.

Looking into the dentist's field from the anatomical point of view I find that dentistry plays a very important role in speech. The tongue has always been considered to be the most valuable and important instrument for normal speech. Nevertheless it has been demonstrated many times that defects of the tongue very often produce only minor defects of speech.

Even with a total loss of the tongue it has been shown that one can speak fairly clear and distinct, altho some of the sounds are always missing. This result has been accomplished by the sub-

stitution of the other parts of the mouth for the tongue motion.

Thus, for example, in the sounds of K & G, where the action is based upon the existence of the back part of the tongue coming in contact with the back part of the palate there may be produced instead of this tongue action a glottal catch far down in the throat, or more definitely above the exit of the larynx, simulating the sounds of K & G. In this same manner a person having a cleft of the palate is able to make the K & G sounds.

Tho seemingly incomprehensible, the consonants t, d, n, l, which depend mainly on the contact of the tip of the tongue with the hard palate can also be produced where a tongue defect exists, by the substitution of lip action for tongue action. If one retracts the lower lip and presses it against the alveolar margin of the upper jaw, the glottal catch is made the same as if the tongue were used, the lip not even completely retracted but its "mucous membrane" is used for a catch about 1/16 of an inch below the edge of the lip.

The S sounds, altho not formed as exact and sharp as when the tongue is used, can be made sufficiently clear by the correct approximation of the upper and lower teeth.

Even the sound of L can be heard fairly well when there is a complete loss of the tongue, as remainders of the genio-glossus are always able to lift the bottom of the mouth thus forming an impediment in the center of the emanating sounding air column, since it is not absolutely necessary to have a complete parting of the air current in order to produce this sound.

The sound of R very often produces difficulties but can be readily substituted by a labial or a laryngeal R. The labials, B. P. M. V. W, can be naturally produced because the tongue is not used at all in the production of these sounds; the B. P. M. W. being formed by the lips only and the F and V by the lips and teeth.

From these examples one can readily deduct that altho the tongue may be completely extirpated one does not necessarily lose the power of speech, that is, it proves that the tongue is not THE ESSENTIAL FACTOR for the production of speech.

Defects of the lips cause disturbances of speech, only when greatly affected. The greatest loss of formation of speech sounds is caused by palate defects. You all know that even small openings found at the junction of the hard and soft palate as produced by syphilis affect the speech causing it to have a strong nasal quality.

No doubt when treating patients having congenial clefts of the palate, when making various kinds of plates, you have noticed that the speech of those patients was more or less affected; but what I wish to point out is, that proportionately the speech defect does not coincide with the size of the palatal defects; for there are small defects which greatly interfere with the production of speech while in some large defects of the palate, even with harelip on both sides, one will find tolerable speech without even resorting to the use of mechanical interference.

If one will carefully test cases of this kind there is usually found some existing condition of the nose or throat responsible for this anomaly. An enlargement of the nose and its parts, or adenoid vegetations in the naso-pharynx is sufficient to produce this condition by acting as a substituting media for the function of the missing palate and thus making possible the formation of speech sounds.

The speech results obtained from the use of plates is varied. Sometimes the speech is noticeably improved in some cases, while in other cases when an obturator is attached the speech shows a slight improvement but is far from being satisfactory, the pronunciation not being normal because the vocal condition

of the patient is defective or because the flexibility of the jaw, which is very important for the attachment of the obturator, does not exist.

Thus you see that in the importance of the parts of the mouth used in the production of speech, the palate, together with the jaw and nose, takes the principal place.

The relation or connection between the palate and teeth is so close that therapy of the palate without therapy of the teeth or vice versa cannot be thought of. But speaking of the teeth alone in their significance for speech I must say that in most cases they have no direct causal effect upon the production of speech sounds because almost all sounds can be formed after a fashion without the use of the teeth, except the hissing sounds of S, Z, X, where the position of the teeth is of importance.

The existence or non-existence of teeth is not so important for good speech as the shape and roof of the mouth, which acts as the sounding board and upon which normal speech greatly depends.

Now let us see why there is such an intimate relationship between the teeth and the palate. We distinguish anomalies of the shape, number and position, besides the structure of the teeth. The most important to us are the anomalies of the position of the teeth on account of their interference with the normal biting ability.

We point out the protruding or direct bite, otherwise called the under bite (Angle-Class III) usually the lower jaw is too large or it is pressed a little forward out of its regular articulatory position. Quite often this is caused from habit or from imitating the speech of others. It is particularly noticeable in many people whose whole articulation seems to depend upon the lower jaw being pushed forward, thereby altering the whole tone or timbre of the speech.

Another abnormality is the projection of the upper row of teeth, the so-called overbite (Angle-Class II). Normally the incisor edge of the lower front teeth fit into the lingual fossa of the corresponding teeth of the upper jaw, while in the overbite the upper teeth project so far forward that their coaptation is simply impossible.

Again, there is the sliding bite produced by wrong positions of the teeth; and the open bite which is caused by the alveolar process of the molars being too big. The front open bite is well known to all of us. Less consideration has been given to the side open bite which has frequently been found in certain speech disturbances.

Besides the effects of such faulty positions, a dislocation of a faulty tooth may hinder the proper coordination necessary for speech. For instance, a front tooth pressed backward out of its alignment may hinder the laying of the tongue on the alveolar margin and produce a hissing sound where there should be a closed or stopped sound.

It is well to realize the fact that speech plays an important role in producing a normal condition of the alveolar process and position of the teeth; for before the cutting of the permanent teeth, the teeth have but a shifting position in the alveoli.

We can compare them to the growing of weeds—just where there is a space a weed grows, and just where there is a space a permanent tooth develops. Even the cutting is arbitrary, for sometimes some teeth appear curved, others the reverse; but we see that after some time they regulate themselves and take their normal places.

We can also state the regulation of the teeth is aided thru speech, by the concerted action of the lips and tongue, the lips pressing on the teeth from one side and the tongue pressing the teeth from the other side. This is contrary to the general idea that the teeth have influence on speech instead of the speech having the influence on the teeth.

This process is similar to what occurs in the formation of the head, the form of the skull depending on the growth of the brain and not the growth of the brain depending on the form of the skull.

We realize that the position and regulation of the teeth are influenced by the motion produced when chewing, by the articulation, and by speech. It is probble that the misformation of the position of the teeth frequently seen in idiots is influenced by the lack of one or more of these performances, of course this not being the only cause. We notice that in an idiot the lower jaw hangs down, the tongue does not lie tightly on the roof of the mouth, therefore the palate does not take on its V shaped angle and the teeth do not grow and stand apart, as they have stuck in the alveolar process before cutting thru.

In the low grade idiot the mouth is always hanging open and the speech is entirely lost.

If we disregard the phenomena of the idiots, the most frequent cause of the anomalies of the positions and cross positions of the teeth is the lack of space. The alveolar process is too small for the teeth and therefore it has been often suggested to extract the first lasting premolar in order to give room for the other teeth.

We can readily see the direct relation of the teeth and palate from the changes that take place in the palate thru the anomalies of tooth position. In the relation of the teeth to speech the form of the hard palate must always be taken into consideration.

If we consider that the lack of space is the most important cause of the anomalies of the positions of the teeth, then this lack of space can produce the following effects: It can produce a pushing apart of single teeth from the row; and it can produce a curving position of the teeth in a horizontal or in a vertical curve.

The pushing of a tooth from the row may produce defects of articulation which are of minor importance.

The arch positions are of greater importance.

Observing the teeth of the upper jaw from below one notices that they are placed in a more or less oval half circle, or in other words, in a horizontal arch. If for some reason the teeth of the upper arch do not properly articulate on the teeth of the lower arch, lateral gaps are formed. These gaps prevent the tongue from correct approach and cause faulty noises when speaking.

The relations are more obvious with the vertical curves. The vertical curve as we observe in the open bite from the front, hinders the natural tight closing of the teeth necessary for enunciating S. Z. X, etc., causing a TH sound in place of an S sound. If these vertical curves in the open bite occur on the side they cause a very disagreeable lateral lisp, which I shall refer to later.

We will now turn our attention to the question: "Which speech sounds are connected with the teeth?

The first to be considered are the sounds of F and V, known as the labiodental sounds. By a normal position of the jaw for the sounding of F, the lower jaw is kept a little back in order that the lower lip can approach the upper row of teeth. The V differs only in one respect, that is, when pronouncing it the voice is used. These sounds can only be given correctly when the mouth formation is normal.

Variations occur at the overbite as well as at the underbite. When there is a prominent overbite, as where the incisor teeth of the upper jaw protrude very much and the upper teeth rest upon the lower lip almost constantly, the patient looks as if always pronouncing the letter F. It is naturally very difficult and rather uncomfortable for him to coaptate his lips.

When it is difficult for the patient to coaptate his lips it is almost impossible

for him to make the labial sounds B. P. M. He will not make the B. P. M. labio labial, that is lip to lip as we do, but he will make them labio dental, because the teeth find the lower lip comfortably near. This labio dental pronunciation of the labial sounds is very characteristic and has also significance in dental therapy because the continuous placing of the lower lip behind the upper row of teeth is without doubt the cause of the steadily increasing prognathy.

Another point is that the upper lip, not used any longer for closing, leaves the upper row of teeth uncovered and always visible to the eye, thus making the person look very unattractive.

In a very pronounced underbite F is often formed between the lower row of teeth and the upper lip. We get such an F. formation in children having a double harelip whose upper jaw is generally retarded in growth and the lower jaw protrudes. The retraction of the upper jaw depends upon the tight scar of the double harelip.

Also, the underbite can be so pronounced that the articulation between the lower row of the teeth and upper lip is even applied to the labials B. P. M. When this is the case the lower lip protrudes so far that it seems to be hanging free in the air, giving to the face, especially in profile, a very awkward appearance.

The next sounds of importance to be considered are the hissing sounds S, SS, Z, X, KS, etc.

In order to pronounce S correctly we bring the lower row of teeth near to the upper so that they are placed almost vertically to their edges. We do not make the usual closing of the teeth but push the lower jaw somewhat forward. The tip of the tongue lies under the lower row of teeth in such a way as to permit the air current to flow between the point of the tongue and the alveolar process, past the teeth upon the lower row and out of the mouth.

The surface of the tongue must not retain its usual half globe shape so that the air current will go in a broad seam upon the lower row of teeth; but, for a normal S, the tongue must so shape itself that it concentrates the air upon the CENTER of the lower row of teeth.

We can easily prove to ourselves this center emission of the air current. If while pronouncing S for a long time we let a tube that is attached to a writing capsule slide along the lower row of teeth, we will notice that the capsule registers only when passing the center of the row; but to the sides, at the left and right, there is no registration.

Again, if we observe the shape of the tongue in a miror while making the S sound we notice that the the point of the tongue, exactly in the center, a groove is formed. If the tongue is now pushed to the alveolar margin of the upper jaw, a short small tube is formed between the jaw and the tongue groove thru which the entire air current passes from the upper space of the mouth and concentrates upon the lower row of teeth, producing the sound of S.

The existence of this tube formation can also be demonstrated by a method of stomatoscopy. The first to use this method was a dentist named Oaksley.

He smeared the palate with flour paste in order to find out on what parts of the palate the tongue touched in pronouncing certain sounds. He did this for the purpose of gaining a starting point in the construction of obturators.

Paul von Gruetzner, an eminent physiologist, had the same idea, but made his method more practicable by painting the tongue with a harmless solution of color and the sounds he wanted to test were pronounced, in order to see on what parts the palate was touched.

If the palate is painted with carmine and then a long lasting S is pronounced, on looking into the mouth direct or by means of a mirror, it is seen that the palate and the lingual side of the teeth

appear colored at the whole alveolar margin except the two middle incisor teeth, which is significant that they were not touched by the tongue. This is where the tube formation mentioned before is formed, the point where the air current concentrates so heavily upon the center of the lower row of the teeth.

A simpler and better method is to blow Kaolin powder upon the palate, covering the teeth with a spoon in order to prevent them from being covered with the powder. If the S sound is then made, one can see not only on what part of the palate the tongue has touched but also what parts of the tongue itself came in contact with the palate.

The palate can also be painted with a harmless water color as ultra marine blue. Of course the designs obtained depend upon the conformity of the mouth, different people showing different designs.

By means of this coloring it is very clear just what parts of the palate are touched as well as what parts of the tongue have touched the palate which physiologically is of decided value.

The point of the tongue in forming the S does not always lie behind the lower row of teeth but often lies behind the upper row of teeth and that can be seen very clearly from the color the palate receives; but there is always present the tube formation concentrating the air current.

If when making a sharp S the point of the tongue is pushed backward, the sound of SH is produced. This can be done by means of a special formed probe which has one of its ends ring-shaped, the ring surface being vertical to the probe handle. With this small instrument one can easily reach the tongue without interfering with sound formation. If while producing the sound of S the point of the tongue is held in the ring and pushed slowly backward, instantly the S sound ceases and the sound of SH is heard.

Now after this physiological digression on the sound of S, let us note how abnormalities of the teeth, loss of alignment, articulatory disturbances, affect the production of this sound. Defects of the S sound are classified as Sigmatism. The term Sigmatism is applied to a dental form of Dyslalia which interferes with the correct formation of the friction sounds—PS, TS, X, MS, NS.

Sigmatism is always attributable to a wrong position of the tongue which is occasioned, as pointed out, by anomalies of dentition and maxillary articulation. The defect occasionally originates at the period of second dentition Sigmatism develops preferably when the upper or lower incisors are missing.

Young children very often have this defect, if eruption of the incisors is delayed. This defect may be permanent, but if due to second dentition is usually transitory providing that the eight incisors are completely formed.

If there is any disability in placing the teeth immediately upon each other, owing to their forming a convex arch with a closed mouth, the consequence will be a vertical anomaly or open dentition.

This will result in the condition which we designate as Interdental Sigmatism, the tongue being pushed between the two dental rows producing a friction sound against the upper incisors.

On account of the open dentition a great deal of the air is lost and the sound emitted resembles TSH instead of S, as for example, the patient says—sthop for stop.

If either the upper or lower maxillae unduly protrude, the sagital distance between the front teeth is abnormally large. This will result in a condition which we designate as Addental Sigmatism.

The tip of the tongue is pressed against the lower margin of the incisors

instead of the upper biting margin giving as a result a sound similar to TH; that is, for example, the patient says, thoap for soap.

The maxilla may be laterally displaced, involving an unilateral or bilateral inward or outward dental anomaly. If there is not enough room for the teeth in the alveolar process of the superior maxilla, some of them are pushed out of the alignment usually inward or the entire dental arch is bent outward; or its margin assumes a convex or concave form. When trying to place these abnormal dental rows upon each other they will form lateral gaps.

Displacements may also be caused by injuries of fractures of the maxilla, altho this does not often occur in childhood.

Both of these conditions which I mention give rise to Lateral Sigmatism.

In Lateral Sigmatism the tip of the tongue is placed behind the upper dental arch, as in pronouncing L, the air current being usually pressed between the molars of one side, rarely of both sides, so that it escapes thru one angle of the mouth This defect is very unpleasant owing to the sound association with L. In the same manner the sound of SH is wrongly formed.

We thus see that when teeth are out of their alignment they generally impede the motion and formation of the tongue, especially where a high palate exists. The sounds of the second and third articulation sphere are more or less strongly impeded, the S more so than the other sounds.

An interesting difficulty is very often encountered when a dentist repairs the teeth and these repairs produce great difficulty in speaking. The patient has to become used to the new proportions of space for his tongue until he again speaks as usual, but it sometimes happens that in cases of this kind the speech difficulties become permanent speech disturbances.

As for example, let us presume that the tongue is so near to the alveolar margin of the upper jaw that with the color experiment only a very narrow groove appears and that in such a case a bridge for the upper incisor teeth makes the space for the tongue still smaller, then the air current will not be able to pass thru the groove needed for the S formation; the tongue will lay too tight to the foreign body and a lisp more or less distinguishable will be heard.

I have had several of just such patients under treatment. These cases were very annoying to the dentist because he was blamed for the condition, but of course blame is out of the question unless a full guarantee against a speech disturbance has been given; but one must admit that the occurrence is rather unpleasant. In cases under contention the remedy is simple enough. The patient is reeducated on the proper adjustment of his tongue for the defect and the speech disturbance disappears.

When a T or D is spoken, unnecessary disturbing hissing noises are very often heard. This is usually due to the speakers' teeth being out of alignment. A case has been described where a side incisor tooth, being pushed back out of the row, hindered the tight approach of the tongue to the alveolar margin of the upper jaw in the act of forming a T, thereby causing an S sound to be produced every time a T or D was spoken.

This occasionally was the cause for rather amusing and complicated statements, for when the patient wanted to say, for instance, "I hear the tick of the clock," he would say, "I hear the sick of the clock;" and instead of saying, "I want my dinner," he would say, "I want my sinner."

Defective enunciation can also be produced by the arches, especially the side arches. In 92% of all cases having a lateral lisp we find that the larger arch is always on the lisping side. This is taken to indicate that a certain rela-

tionship exists between the side arches and the Lateral Sigmatism.

Attention has been called to this fact and it has been recommended to eliminate the arch and make room for the other teeth by the extraction of a tooth. This has been done but the lateral Sigmatism was not affected. We therefore see that the arch is not always the NECESSARY cause of the lateral lisp.

This is also substantiated by the fact that there are thousands of people with side arches who can pronounce the S without a fault.

In regard to the S formation the faulty deviations appear at oblique articulations when occurring at the time that the teeth change. A tooth placed irregularly hinders normal articulation and causes the child to shift the lower jaw to one side. This can be noticed during speaking and in the side deviation of the S sound.

A word about the relationship between the position of the teeth, the roof of the mouth, and the tone of voice. Without doubt, the roof of the mouth has a very great acoustic influence upon the tone of the voice. We see it in cases where the lower jaw is pushed forward when speaking forming a peculiar articulation basis which alters the tone.

The general clearness of the vowels and consonants is influenced by the roof of the mouth. A very interesting subject to investigate is the influence on the tone of the voice produced thru plates covering the palate. That such an influence exists any sensitive ear can easily detect.

When a patient with or without a plate pronounces a certain vowel differences in tone are readily noticed. To that which our ears can detect can be added the recording of the voice by means of apparatus.

It would not only be of extreme importance for science but also of valuable use in practice, to confirm what sort of plates alter tone, just what these changes are, and whether the material from which a plate is made produces a difference in tone color. That there is a possibility and a necessity for such an investigation nobody will deny. Several preliminary tests have been made.

Totally different tone curves have been produced, when for example, the vowel A is spoken normally, or is spoken nasally, or spoken when the soft palate is pressed tightly against the wall of the throat, by an apparatus similar to an obturator.

It should be a very interesting experiment for the dentist to try to produce such sound curves with different obturators made from different materials. The strong vibrations that the palate and all other curves sustain in singing points to the fact that the resonances that have been originated contribute largely to the tone of the voice. If we then would be able to influence the resonance of a singer, who requires artificial material in his mouth, by selecting a special material or a special form, that would indeed be important and practical results of these experiments.

Gentlemen: I hope I have succeeded in establishing in your mind the vital correlation between teeth and speech, between the dentist and the speech specialist. I personally, thru my work, have realized for quite some time the great necessity for something of a more definite nature to be instituted in order to make it possible for the dentist to come in closer contact with the speech specialist.

I am pleased to inform you that from now on all those interested will have the advantage of just such a relationship. At the New York Clinic for Speech Defects, a free public defective speech clinic of this City, provisions have been made for an exchange of ideas between dentistry and speech specialism thru the existence of a general Information Bureau.

Associated with the Clinic are men representing all branches of Medicine

and Dentistry, consequently any desired information will not be limited.

While this field of scientific research is in a sense not new, still we must admit that it has hardly begun to be explored. Let us feel that with my few remarks here I have not only stirred your interest but have instigated you to special efforts of investigation along this line.

Thru the cooperation made possible by the New York Clinic for Speech Defects we may reasonably feel that we can look forward to the general betterment of teeth, voice and speech.

DISCUSSION.

Milo Hellman, of New York City.

If I am permitted to show a few lantern slides, I think I could illustrate to good advantage what the essayist has just said.

See supplementary notes and illustrations.

(Dr. Hellman showed slides.)

Dr. Greene: I simply want to thank the gentleman for supplementing visually what I tried to explain to you in my paper.

Milo Hellman: That a large number of the sounds involved in speech are dependent for their correct enunciation upon the teeth and the dental arches is aptly illustrated by the following facts: 1. A child, whose speech had been distinct and clear, will suddenly become unable to pronounce certain sounds correctly. This will usually occur when the first of the deciduous teeth begin to be shed. Thus, with the loss of the lower central incisors the sounds of s, z, sh, ch, etc., will become defective. By the subsequent loss of the upper central incisors there is an increase in the disturbance of speech; for, in addition to the above sounds being defective, the pronunciation of f, v, also become indistinct. Similar phenomena may also be observed in the adult when like units of the dental series are lost during the period of senility.

Moreover, given a denture with the full complement of teeth, speech defects may be observed that are not only of a similar but also of a considerably more aggravated character if the occlusion is abnormal. To illustrate we may appreciate to what extent the vowel sounds *a, e, i, o, u,* will be affected in a case as presented in figure 1a. These sounds, by resting the tongue in the floor of the mouth, and changing the form of the apperture of the mouth and the oral space above the tongue by the manipulation of the lips and the dorsum linguae, the variety of sounds represented by the vowels is effected. In figure 1a it will

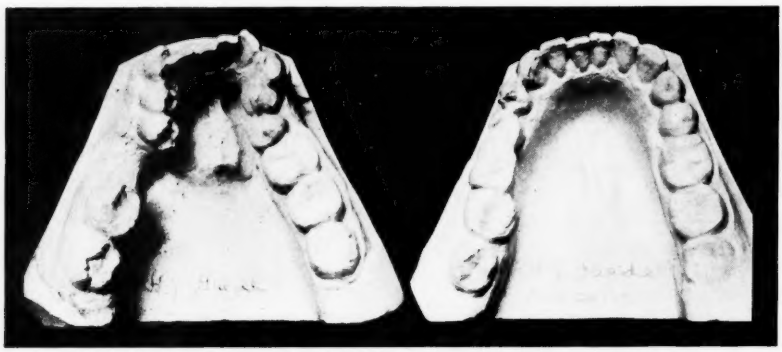


Figure 1A Figure 1B

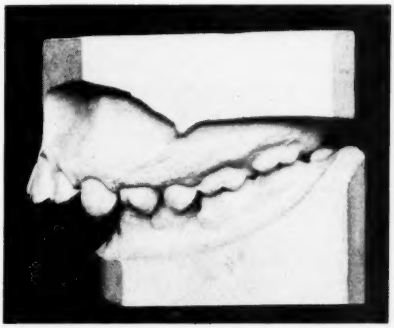


Figure 2.

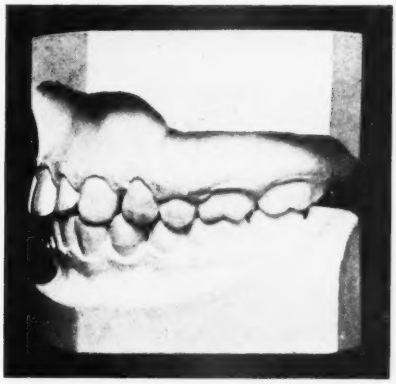


Figure 5.

Figure 3.

Figure 6.

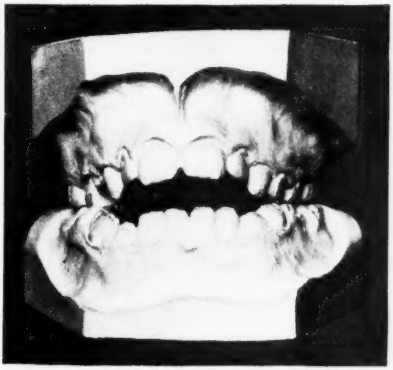


Figure 4.

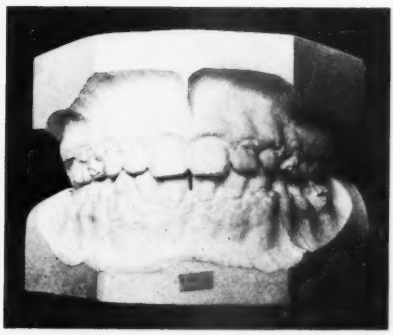


Figure 7.

be seen how difficult,—if at all possible,—it would be to adjust the tongue in the necessary position. The adjoining figure (Figure 1b) will convey an idea to what extent the lower arch had to be modified in order to establish normal occlusal conditions. At the same time it will also illustrate how much more easily the tongue may be manipulated during the act of speech in the corrected condition than was possible before. The sounds of *s, sh, c, ch, z, f, v,* etc., will be affected by dentitions presented in figures 2, 3 and 4. The correct enunciation of the sound *s* is accomplished by placing the incisors of both jaws in an edge-to-edge position, the tip of the tongue pointed toward the lingual surface of the lower incisors below their incisal edges. If the extreme distance between the upper and lower incisors of figure 2 be noticed it can readily be imagined what a task this effort would entail. But while in figure 2 the correct pronunciation of *s* entails only a difficulty, it becomes an impossibility when the teeth are in such forms of malocclusion as are presented by figure *3* and figure *4*.

The sound of *f* is produced by placing the upper border of the lower lip against the incisal edge of the upper teeth. If figure 2 be examined again it will be obvious that the upper border of the lower lip would be in contact with the lingual surface of the upper incisor nearer the palatal than the incisal margin. But on the examination of figure 3 the reverse will be found to be true. The attempt in the latter case to express the sound of *f* will bring the lower lip in contact with the upper lip instead of the teeth. The manifold nature in which occlusal anomalies may interfere with speech is too vast to be discussed to greater extent in the limited time at disposal. We can therefore only touch upon the most salient points involved and conclude by showing in figures 5, 6, and 7, representing the treated cases of figures 2, 3, 4, and emphasize that by the correction of the occlusal anomalies, the causes underlying defects associated with speech, are also removed.

THE TEACHING OF CONDUCTIVE ANESTHESIA.

By Theodor Blum, D. D. S., M. D. (Penn.)

Director, Department of Oral Surgery, New York Throat, Nose and Lung Hospital, Columbia University, Advanced Courses in Dentistry. Assistant Professor in Oral Surgery, New York Post-Graduate Medical School and Hospital.

(Read before the National Dental Association at Its Twenty-first Annual Session, New York City, N. Y., October 23-26, 1917.)

Necessity of Practical Courses for Small Groups of Students With Individual Instruction and of Preliminary Study of the Anatomy of the Parts Involved.

HAVING taught Conductive Anesthesia for the past five years, I venture now to write my opinion on this subject.

It was comparatively easy for me to outline a successful plan of teaching because I had personal experience here and abroad in being taught medicine and dentistry by different methods. Among these were not only the old didactic lectures, but also demonstrations and actual work. It did not take long to find out that I profited most, where, after preliminary studies and demonstrations, I was allowed to do the actual practical work on the patient under the personal supervision and instruction of the teacher.

On account of the expense and the lack of a large number of teachers, it is impossible for each student to receive private, individual instruction and, therefore, we have to adopt the next best way, which is, the individual but not private instruction of small groups (which means about six students). In the average case, we have found ten sessions, of about three hours each, sufficient to give such a group a good fundament on which to build up, by further practical experience in their own office, and study, a satisfactory working knowledge on the subject. Of course this means that they have to study the anatomy involved and the literature before entering the practical course.

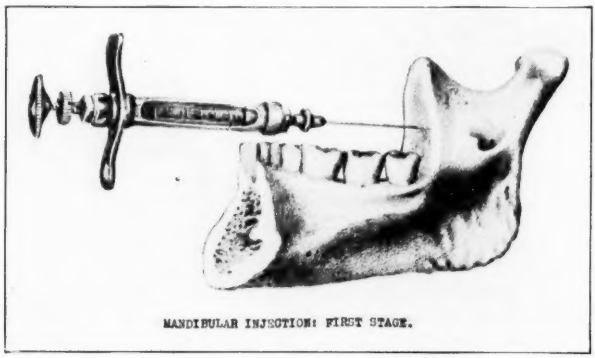
Discussion of Asepsis, Solution and Instruments.

It is to my mind very important to make each part of the study as simple as possible, and then insist that, while under our supervision, everything is carried out exactly as taught.

The sense of asepsis not being well developed in our profession, I lay especial stress on its observation. We must not overlook to correct the students whenever neglecting this important item. For instance, the dentist is very apt to put his hand on the chair or button his coat, etc., after having scrupulously washed his hands. It seems to be more difficult to have him rid himself of these habits than to make him understand that instruments have to be sterilized, solutions boiled, etc. It would lengthen this paper unduly to give the technic of the preparation of the anesthetizing solution dealt with in previous articles. Suffice to say that the complex array of paraphernalia which has been recommended and invented by some men who appear to have a lot of time and money, have

not only scared away a good many earnest men, but are absolutely unnecessary and, thru their complexity, dangerous.

I recently read an article in which about half a dozen different needles were recommended. In my experience two needles only are necessary; a long thin steel needle for all injections, except the mandibular, for which a heavier needle is employed. Where iridio-platinum needles are used, one long needle is sufficient. The use of both should be taught, each having its advantages and disadvantages. Nothing new can be said in regard to syringes, a number of new and promising ones being still on test.

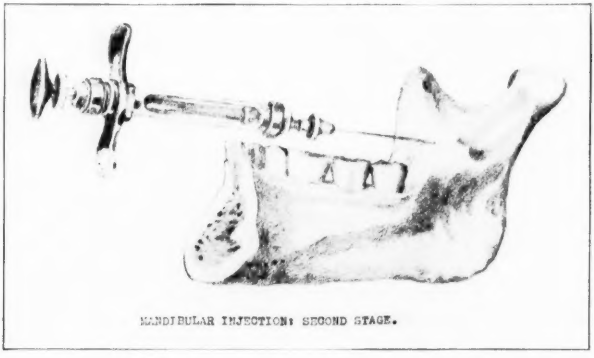


MANDIBULAR INJECTION: FIRST STAGE.

Figure 1.

DEMONSTRATION OF THE ANATOMY AND ALSO THE TECHNIC OF INJECTIONS ON WET SPECIMENS.

I first received the stimulus to study thoroly the anatomy of the jaws, thru an article written by Seidel* and then con-



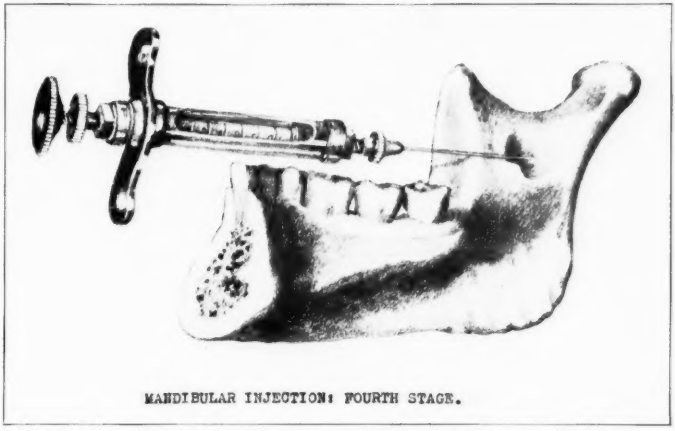
MANDIBULAR INJECTION: SECOND STAGE.

Figure 2.

*Seidel: Die Mandibular anaesthesie. Deutsche Zahnheilkunde in Vortraegen. Heft 28: Leipzig, 1913.

ceived the thought of the importance of using anatomical specimens for teaching purposes. I was encouraged in this work by the ease of instruction (with the help of these specimens) and the comments I heard when demonstrating at the National Dental Meeting in Rochester, 1914.

In my collection there is one head which I have been using for demonstrations ever since I commenced teaching. The head, after being injected by color-



MANDIBULAR INJECTION: FOURTH STAGE.

Figure 3.*

*The third stage during which the syringe is turned towards the opposite side so to have the needle point come in contact with the mesial aspect of the ascending ramus is not illustrated because it could only be seen well from a superior view.

ing material and hardened in formalin, was then frozen and cut on the right side horizontally 1 cm. above the occlusal surfaces of the lower teeth, the plane of mandibular injection. After cutting thru the skull the left temporo-mandibular joint was exarticulated. Now I was able to use the lower half of the specimen for two purposes: the right side was a section (thru the plane of mandibular injection) showing all the structures which are of importance; the left side was dissected to give a picture of the course of blood vessels, nerves, etc., thru the pterygo-mandibular space, also the osteology of the region, namely, external and internal oblique line retromolar triangle, etc. In the mental region of the same side a window was cut thru the skin and the parts prepared to give a clear picture of the mental foramen and the structures passing thru it. The left maxilla of the upper half of the specimen was dissected buccally to show the tuberosity and the posterior superior dental nerve in its connection with the main division of the fifth nerve, etc.

In the infraorbital region a flap was cut and the infraorbital foramen, nerves and blood vessels prepared. The palatal side demonstrates the structures in that region. I found it extremely useful and successful to be able, after a thoro demonstration of the anatomical parts, to show first the osteology of the ascending ramus, then the passing of the mandibular needle thru the dissected parts on the left side of the specimen and then repeating the technic on the right side by having the needle pass over the section, (which means on the level of mandibular injection), while, of course, in

both instances the palpating index finger remained in position.

With the help of these specimens the advantages and disadvantages of different methods can be clearly shown and easily understood. For the demonstration of the other injections, the simple preparation of the specimen as outlined above is sufficient for the teaching of beginners.

as adults, must be treated individually, one rule not being applicable to all patients. An occasional visitor at times may consider us rough or impolite in handling the patients, but longer observation will teach him as well as we were taught by experience that some patients have to be spoken to very politely and patiently, while with others stern and

Figure 4.

The back of the hand as used at the chair for demonstrating the ascending ramus of the mandible and the technic of the mandibular injection.

For more advanced students other specimens, especially for the study of mandibular injection, have been prepared at different levels, pictures of which have been published sometime ago.

Management of Patients.

While one may be even an expert in every phase of the subject, he may fail on account of his lack of ability in the management of patients. The student must watch the instructor very closely in this part of the work. Children, as well

resolute manners must be adopted. To some patients you can explain in detail, if necessary, what will be done, while in other cases again it may be advisable to talk as little as possible without seeming to neglect the interest we have for the patient and the work to be accomplished. It requires experience to read and understand each individual, and we must never lose patience to accomplish our task. Rarely can Conductive Anesthesia not be employed on account of the impossibility of managing the patient.

Teaching of Palpation, Injection, Etc., on the Patient.

The preliminary study of the anatomy, the demonstration of same and of the technic of the injection on the wet specimen, make the application of the method on the patient so much simpler and easier. In regard to palpation the student must become familiar with the fact that the best palpation can be accomplished with the index finger only, and that this finger must be employed for this purpose in all injections with the possible occasional exception of the mental. We must learn to palpate gently and carefully without causing the patient the least pain or even discomfort. We must understand palpation is successful only if done lightly, as the different types of tissues cannot be distinguished if the palpating finger rests heavily and presses hard upon the underlying parts. The operator must stand a certain distance away from his patient, so that the neighboring joints, like the wrist and elbow, are not actually bent but nearly straight and at ease. This is best accomplished by standing in front of the patient, as I believe all operations in Conductive Anesthesia as well as Oral Surgery should be performed. Altho nearly every student objects when asked to make certain injections (mandibular, infraorbital) on the left side with the left hand, still they learn very quickly to manage the syringe with that hand and I must say that I cannot see any reason why a dentist who does a good part of his daily work with the left should not make an attempt at it. In fact each one of them ridiculed afterwards his fear that he would not be able to work except with his right hand. I must admit that being naturally left handed and having been forced to use also the right hand, put me in a position where I can use both hands equally well. In that way I found out that a mandibular or infraorbital injection on the left side can be more easily and better accomplished by palpating with the right index finger and injecting with the left hand, especially if we agree that all operations should be performed while standing in front of the patient. The student must remember that when injecting, the solution should be of about body temperature, that the syringe must be gently handled and held in the hand like a probe so that the needle will easily stop at a point of resistance and surely work itself into its proper position without bending or breaking and without injuring the anatomical structures with which it comes in contact.

Other Adjuvants in Demonstrating at the Chair.

A few years ago I discovered, if I am permitted to call it so, an adjuvent for the teaching of mandibular injection which I consider extremely helpful in demonstrating at the chair.

I found, by abducting and extending the thumb from the index finger, a picture is created which wonderfully resembles the structures encountered on the ascending ramus of the mandible. The tendons of the extensor brevis pollicis and extensor longus pollicis form the external and internal oblique lines, while the groove ("snuff-box") between them makes up the retromolar triangle. By following tendon, representing the external oblique line upward, we reach the tip of the thumb forming here the coronoid process, while the circular line from the thumb to the index finger resembles the singmoid notch. The tip of the index finger may be called the condyloid process. The back of the hand corresponds to the inner aspect of the ascending ramus.

The whole technic of mandibular injection can thus be demonstrated at the chair without the anatomical specimen. Each hand can be used to represent the corresponding mandible, and the palpation and demonstration of the injection can be done with the free hand.

In the same way the tuberosity injec-

tion can be shown by representing the buccal roots of the second molar with the first and second fingers and of the third molar with the third and fourth fingers. We can now explain that the insertion of the needle is made at a point which corresponds to the middle of the disto-buccal root (represented by the second finger) of the second molar and that the needle then proceeds upward and backward over the apices of the buccal roots of the third molar (represented by the third and fourth fingers).

Again, in demonstrating the anatomical position of the mental foramen, we can use the palm of the hand, assuming the lower part of the palm to be the lower border of the mandible, the line connecting the roots of the fingers as the alveolar border and the first and second finger as the first and second bicuspid. Then we can show that, in a vertical direction the mental foramen lies either below the second bicuspid (represented by the second finger) or below and between the two bicuspids (represented by the first and second fingers), in a horizontal direction, in the middle between the alveolar border (represented by the line connecting the roots of the finger) and lower border of the mandible (represented by the lower border of the palm of the hand).

One must be in a position to sketch clearly the anatomical structures in their proper relation, so as to be able to demonstrate and explain quickly the points in question without having many different sections and dissections at one's disposal. Most frequently we are called upon to draw the pterygo-mandibular space and containing structures, also the position of the needle during the different stages of the mandibular injection.

Lack of Success Due Only to Neglect of the Above Important Principles.

To be successful one must have small classes with individual instruction and not only time but also a great deal of patience.

I can frankly say that while teaching is often quite strenuous and tiresome, it always has given, and still gives me, a great deal of pleasure and satisfaction, as we ourselves learn while teaching others.

Previous Papers Read on Local Anesthesia.

"Local Anesthesia," Items of Interest, March, 1914.

"The Technic of Conductive Anesthesia," Dental Summary, February, 1915.

"Mandibular Anesthesia," Dental Cosmos, January, 1916.

"Notes on Conductive Anesthesia," The Journal of the National Dental Association, October, 1917.

Discussion.

(Read by Dr. S. L. Silverman, Vice-Chairman, in the absence of Dr. Ivy.)

Robert H. Ivy, Milwaukee, Wis.

My discussion of Dr. Blum's excellent paper will be necessarily limited owing to my agreement with him on practically every point. To my mind there is scarcely anything in it that should not be emphasized. Simplicity of armamentarium and aseptic technic is the keynote of success in conductive anesthesia. I see no practical reason for the employment of freshly distilled water, Ringer's solution, special porcelain dishes, needle guards and other paraphernalia that tend to frighten away the average practitioner and make him think that the method is something beyond his reach. All of these frills may be dispensed with with perfect safety and success, even tho each one may have a theoretical justification. A steel needle is every bit as good as a platinum one as long as it is sterilized by boiling. Ordinary boiled water rendered isotonic by the addition of sodium chloride in the proper amount is absolutely harmless in the small amounts employed for injection. It has been used in this way for several decades in hospitals in subcutaneous infusions of 1000 cubic centimeters without damage

to the tissues. The solution can be boiled just as well in an ordinary tablespoon as in a fancy porcelain container. More emphasis should be placed on sterilization and cultivation of the sense of asepsis and less upon any special armamentarium. Syringes should be boiled before use and not kept in uncertain antiseptic solutions. The use of the hand as a model for demonstration purposes seems to me to be excellent. Ever since taking up the use of conductive anesthesia, which was before Fisher's visit to this country, it has been my habit to make the left mandibular injection with the right hand and that of the right side with the left hand. Tho not naturally left handed, I am convinced that with a little practice this habit can easily be acquired by anyone, and its convenience is unquestionable. The essayist is to be heartily congratulated upon the simplicity and, at the same time, the thoroness with which he presents the subject to his students.

Arthur E. Smith, Chicago.

It gives me great pleasure to enter into the discussion of Dr. Blum's paper, and I wish to compliment the essayist upon the manner in which he has presented the subject. I agree with everything in the paper with but two or three exceptions. I do not employ or advise the use of steel needles for deep nerve blocking injections nor do I use as few needles for all classes of local anesthesia as the essayist recommends. Personally, I employ platinum-iridium needles of known length and diameter for the routine injections, with the exception of blocking the terminal division of the infra-orbital nerve by the extra-oral method and for the initial injection prior to producing intra-osseous anesthesia. From personal experience I have found that I can do better work by employing several needles—say four or five—than to try to make all the various injections with one or two. When I say this number it includes the needles employed in the injections for extra-oral and intra-oral methods. This includes the various nerve blocking injections; terminal or infiltration, intra-osseous and the deep intra and extra oral injections. This, however, is due to personal experience and the operator who uses but two needles can probably do just as efficient work for certain injections, but when we consider all the methods of producing local anesthesia as I have already stated, it certainly requires more than two needles.

The subject of Dr. Blum's paper, namely, "The Teaching of Conductive Anesthesia," is a very important one at this time, for the reason that so many members of the profession are vitally interested in the relief of pain while performing dental operations. A great deal of credit is due Dr. Blum for the work he has done along this line, and it was my pleasure to observe the anatomical specimens he prepared while I was in New York several years ago. In the teaching of nerve blocking the use of properly prepared wet-anatomical-specimens are of immeasurable value, for they give the student a much quicker and better knowledge of the anatomical structures with which he should be familiar before attempting the various nerve blocking injections. If one is not familiar with the anatomical parts, the relation of the bony-landmarks to the various nerve branches, arteries, veins, foraminae, he is not going to make the injections in an intelligent manner. Many dentists think all that is necessary in order to carry out this important phase of anesthesia is to have a hypodermic-syringe, a needle and the injecting solution, but allow me to say, that a thoro knowledge of the subject is far more important than all the equipment put together. The operator who attempts to make the deep injections, without first familiarizing himself with the subject in all of its details, will no doubt encounter numerous failures. It has been my pleasure to prepare a number of wet-

anatomical-specimens to show the various structures as they are found in life. It has been very gratifying to me to have the opportunity of spending hours in the preparation of specimens for nerve blocking injections in oral surgery, dental and throat operations, such as the removal of the tonsils, and to have discussed them before various societies and study clubs. Tomorrow and Friday some of these specimens will be shown in the illustrated clinic with motion pictures.

In the absence of Dr. Ivy I regret to take exception to a part of his discussion with reference to distilled water. He says it is not necessary to use freshly distilled water, if it is kept in a suitable container, or is boiled to render it sterile. According to the teachings of bacteriology we are aware of the fact that it is necessary to boil water for a period of fifteen minutes, each day for three consecutive days in order to render the solution sterile. Distilled water does not mean sterile water, by any means, and it is always better to prepare the distilled water fresh every morning, than it is to keep a stock solution on hand for an indefinite period of time and take chances on injecting a solution which does not conform to the law of bacteriology. I wish to say a few words with reference to my findings with Ringer's solution. From the offices of ten Chicago operators I obtained samples of their stock Ringer solution, and took them to the bacteriological laboratory and made tests. Bouillon was inoculated with each sample, and after a forty-eight hour growth the specimens were transferred to petri dishes containing agar-agar; out of the ten specimens nine gave positive cultures. Out of ten specimens of stock distilled water, obtained in the same way, ten gave positive cultures. This should prove that stock distilled water and Ringer or Normal Saline solutions are by no means sterile. Many dentists do not boil their distilled water or Ringer solution, dissolving the tablets without taking any precautions whatsoever. In case sepsis follows such unscientific technic, they ought not to blame nerve blocking, but should place the blame upon themselves. It is quite true that nature is very kind in combating infection, but we cannot expect the impossible in every case. It might be of interest to some of you to know that I have perfected the technic for anesthetizing the tonsils. I do not mean anesthetizing them by the infiltration method, as is being used, but I mean anesthetizing them thru the medium of nerve blocking. Time will not permit me to discuss this phase of the work, but just in a few words will say that the tonsils are completely anesthetized by blocking the palatine nerve branches which are given off Meckel's Ganglion in the spheno-maxillary fossa; and the tonsillar plexus, which is derived from branches from the glosso-pharyngeal, uniting with branches from the pharyngeal plexus. Two injections are necessary; one for the plexus and one for the palatine nerves. A straight needle with an extension hub is used for the plexus injection. The same needle is used with curved hub and extension for the palatine branches as employed for blocking the second division of the fifth nerve, on the posterior lateral surface of the superior maxillary bone. Complete anesthesia is produced within a few minutes following the injections and tonsillectomy is made a painless operation, and last but not least the operator has the co-operation of his patient and no inspiration of blood and mucous.

In closing I again wish to compliment the essayist upon his paper, and I know you have profited very much from it. Remember that thoroness is the keynote to success, and after you have thoroly mastered this important link in your duty to mankind, you have added a method to your practice which will repay you many times for your effort in gratitude from your patients. We know

that the easiest way to earn gratitude, is to relieve pain, and this can be accomplished thru the various mediums which science offers today. Science has shown both medicine and dentistry, many valuable things within the past few years. They have opened new fields to the man who wishes to progress in his profession. The field of anesthesia is surely a large and scientific one, and the modern dentist of today should take advantage of those methods which science affords him. The subject of anesthesia is certainly a broad one, and no single anesthetic is 100% perfect; therefore, in order to attain the highest ideal, we select the anesthetic and method which is best adapted to the individual case. But I think when nerve blocking injections are skillfully made that a very high percentage of cases will meet the approval of the most exacting operator. In order to obtain the best results the technic must be mastered and a strict adherence to dosage, isotonia and sterility of the injecting solution must be followed. And last but not least strict asepsis must be observed at all times. I wish to thank Dr. Thoma for calling on me to enter into the discussion of this important subject.

Richard H. Riethmüller, Montclair, N. J.: It seems to me that the discussion has drifted away from the subject. We are, I regret to say as dentists continually fiddling around from pillar to post, every man having a different method, and a great deal of conscientious effort is wasted because we lack standardization. Dr. Blum's effort aims distinctly at standardization and unification. The more suggestions of this sort we receive and abide by them, the better it will be all around. We don't want fifty methods of conductive anesthesia; we only need one, because human anatomy is more or less the same, the distribution of nerve branches is fairly uniform; and,—the basic principle being the thing,—*one* generally endorsed and accepted method is sufficient.

Correction of Discussion.

Dr. Blum:—Dr. Riethmüller has been kind enough to close the discussion for me. I must agree with him that the discussion of Drs. Silverman and Smith, while interesting, covered other subjects than the one dealt with in my paper.

In regard to steel needles, I wish to say that while I have no objection to the use of iridio-platinum needles, I would advise all of you who teach Conductive Anesthesia to have your students use steel needles at first, because they do not bend easily. After they are familiar with the technic they can choose any needle they prefer. The thin steel needle should never be used for mandibular injections.

If I understand Dr. Ivy's discussion correctly, he stated that ordinary boiled water would answer the purpose as well as sterilized. Even tho this were the case, on account of the small amounts we use, I would not teach its use to students, because it would increase the usual carelessness found in our profession regarding exactness in this connection. It is very important in teaching to be as strict as possible with every detail of the work.

THE WAR DUTIES AND OPPORTUNITIES OF DENTAL SCHOOLS.

By H. E. Friesell, B.S., D.D.S., Pittsburgh, Pa.

(Read before the Twenty-fifth Annual Meeting of the American Institute of Dental Teachers, at Pittsburgh, Penn., January 29-31, 1918.)

IN THESE strenuous times when millions of men are sacrificing all that is dear to them for the preservation of liberty; and when our country is straining every nerve to develop an all round efficiency that will result in an early and complete victory for the forces of humanity and civilization, over the exponents of the most selfish devilishness in the history of the human race, it becomes necessary for each one of us to consider seriously how every activity with which he is in touch can be developed to the utmost to bring about this result.

The war is so big and so terrible, and seemingly so far away that one is inclined to feel that there is no way in which he can do anything toward its successful prosecution. But the grand aggregate of services rendered by millions of seemingly unimportant participants will make final victory certain.

When the writer watched the posting of bulletins in the city of Boston announcing the beginning of the war in 1914, he was weighed down by a feeling of great depression; but little did he dream that our own country would soon be in the midst of the war. Such a thing seemed utterly impossible, but now we know how true it is. How much deeper we are to get into it, no one of judgment would attempt to predict; but the supposedly impossible happened when war was declared; and supposedly unthinkable in human acts have been repeatedly performed by our enemies since hostilities began. It is therefore only the part of wisdom that each American shall make up his mind that this is his war, and that the earnestness with which he carries on his part in it may have much to do with its final outcome.

The dental schools recognized their duty to the cause of humanity and as soon as our government declared war they unanimously offered their services. When the draft law threatened to endanger the supply of dentists for army and civilian purposes, it was the dental schools who fought out the question and secured the intelligent application of the law to the dental situation. The representatives of the schools have served as examiners without commissions and without pay and have thus enabled that rapid building up of a Reserve Corps that is fully ample to meet any present emergency. As an indication of how this has worked out in the Dental School of the University of Pittsburgh, it may be interesting to note that of 57 members on the faculty, 29 have been commissioned, and six are on active duty, three of whom are already in France. One hundred and sixty alumni of the school have been commissioned, of whom 51 are in active service and 109 are impatiently awaiting the call to active duty. Of the 335 students all men over 21 years of age have joined the Medical Enlisted Reserve Corps of the Army, which means that they will be called, upon graduation, into service in the

medical department, where the training they have had in dental school should be of great value in hospital work. **Experience will undoubtedly prove that the provision of one dentist for 1000 soldiers is entirely inadequate, and if as is hoped, the law may be changed to provide two, or what would be more satisfactory, three dentists per 1000 soldiers, our schools will still be able to meet the situation.**

The clinics of all the schools were immediately opened freely to the enlisted and drafted men, and a large number of applicants for admission to the Army and Navy, who had been rejected on account of dental deficiencies, have been enabled to enlist.

However, the whole duty of the schools has not been met by the foregoing activities. It becomes equally essential that we should take stock of our institutions and study wherein we may do still more to render a larger service in this great emergency. This thought brings us to a consideration of what will be required of the dentist in the army, and whether the schools can do anything to give their graduates a better preparation for such work. Undoubtedly military dentistry will be different in many ways from civilian practice and anything the schools can do to meet the new problems will count just as much toward the successful operation and efficiency of our great fighting machine.

Earlier in the war many of us were inclined to think that much of the work of the army dentist would be in the field of plastic and oral surgery, and a great deal of thought was devoted to plans for developing this work in the schools. However, actual contact with the dental situation as it has developed in the cantonments has shown that the present allotment of dentists will be kept more than busy in taking care of the common dental needs of the men, such as plastic fillings, artificial dentures, prophylactic treatments and extraction of teeth. Statistics show that about 90% of the drafted men have never had any dental attention beyond an occasional extraction. The experience of our Canadian confreres bears out these facts and they strongly urge that we lay stress upon teaching our students to be exceptionally proficient in plate work, and cement and amalgam fillings.

While undoubtedly there will be a great amount of work to be done in the field of plastic and oral surgery; there will be such a vast excess of plain-line dentistry required that the schools must not overlook this fact, as is liable to be the case, owing to the more spectacular appeal of oral surgery.

On the other hand there is a dearth of capable oral surgeons, and each school should aim to select those men who are best fitted by education and aptitude for such work and to assist them in becoming proficient in this field. Not every dental student can be developed into a capable oral surgeon, nor is every school equipped for training such men. There are certain schools which for various reasons, are better fitted for training men in oral surgery than are the others, and the promising young members of college faculties, and the graduating class should be encouraged to go to the schools that are able to give this special work.

While it would be unwise for a school that was not admirably equipped in every way to take up the special teaching of oral and plastic surgery for dentists, every school can do much to make each graduate better prepared for military dentistry than has been necessary heretofore. Intensive work should be done in the anatomy of the head and neck.

The course in conductive anesthesia should be made very complete; and special efforts should be exerted toward teaching each graduate to become an intelligent and capable extractor, as nothing will do more to cause the young

army dentist to lose his nerve, and the confidence of the soldiers, as low efficiency in extracting.

Greater attention should be given to the treatment of fractures and dislocations and all good methods of splinting and wiring should be covered. Gunshot wounds, serious infections, the control of hemorrhage, and the principles of bone and skin grafting should be taught as live subjects and not simply as of academic interest.

First-aid work, bandaging and the treatment of fractures of bones other than those of the jaws should be gone into thoroly, for such knowledge will enable the dentist to render valuable assistance to the medical department in an emergency.

Special facial prosthesis, surgery on the cadaver, and radiography should be given more attention, as more experience in this work will enable the dentist to be of much help to the oral and plastic surgeon.

Unfortunately it will not be long until ship loads of our wounded soldiers will be returning to this country, and our dental schools should get ready to render the greatest possible services to those who may need our help.

Another, and a very important field in which the dental schools have an opportunity to perform a war duty is to be found in the matter of instruments. If by some means we could adopt a uniform or standardized set of instruments for college use, a very long step forward in dental efficiency would result. The making of dental instruments requires workmen skilled in a special field and one where they were none too plentiful before the war. The standardizing of instrument sets, and the simplifying of instrument forms would do much to relieve the shortage in workmen and to overcome the difficulty we are having in procuring instruments.

The government has had so much trouble in obtaining dental supplies that it has strongly urged this action, and the dental manufacturers have been laboring under such handicaps for lack of skilled men and machinery to meet the increased demand for dental instruments that they are willing to cooperate to the fullest extent in any work toward this end.

It is not to be expected that, we can adopt finally at this meeting any special set of instruments that would be satisfactory for all schools, nor does your essayist feel that any one man is sufficiently familiar with all departments of dental teaching, and the local situation in the various schools, to enable him to select such a set of instruments; but he was a member of a special committee that was appointed by the Committee on Dentistry of the Council of National Defense to take up this work, and he desires to offer the following list selected by some members of that committee, simply as a tentative set of instruments for college use, and eventually for army use, so far as it may cover the needs of the army.

In making up this set, the instrument lists of 46 colleges were checked over. Two-thirds of the schools would have very little difficulty in adopting this list as it stands; the other third would require more or less extensive adjustment. Your essayist will welcome any suggestions, criticisms, or cooperation offered by the members of the Institute, and hopes that we may be able to approach an agreement on this matter close enough to justify referring the work to a committee for amplification and final adoption by most, if not all of the schools in time for ordering next year's instruments.

OPERATIVE INSTRUMENTS.

For Examination:

Explorers—3-(13-14 R. & L.) 6-17-2-9-10.

Mouth Mirrors—3-52-(6 Mag).

Water Syringe—No. 22, special nozzle; metal, self filling.

Chip blower—No. 22 special nozzle (valve rear); No. 38.

Cavity Preparation:

1 set Black's Cutting Instruments—48-L. H.
1 Chisel—48.
1 pair cotton pliers (College).

For Amalgam Work:

7 Black's Amalgam Pluggers.
1 Woodson's double end, No. 3.
1 Burnisher No. 42 L. H. 7 in.
8 Crandall's Pluggers.
Mortar and Pestle.
Mercury Holder.
Alloy Balance.
Amalgam Carvers.

For Cement Work: Zinc:

Plastic Instruments 39-45-46-47.
Ash's Instruments 1-2.
Cement Spatula: Caulk's (All nickel); Weston's; No. 36.
1 Glass Slab.

Silicate:

Tantalum Instruments.
Agate Spatula.
Glass Spatula.
Celluloid strips.

FOR GOLD WORK.

Filling:

Black's set, 16 complete.
Holding Instrument.
Automatic Mallet.
Hand Mallet—5-15-1.

Finishing Instruments:

2 Finishing knives, 12 and 18 angles.
4 Finishing files, 6 and 94 angles.
1 Black's saw frame.
1 dozen Kaeber saws, 1 edge.
1 dozen Thread saws.

1 pair shears No. 31.
1 Mica annealing tray No. 6, with metal handle.
1 Chamois pad.
1 pair foil carriers—11-12-20-2.
1 Alcohol lamp.

ROOT CANAL WORK.

Metal Broach holders.
Broaches—Barbed; smooth round; smooth soft, square; Kerr *B*.
Canal plugger No. 1.
3 Canal probes—(fine, flexible).
Glass tray for broaches.
Glass slab for sterilizing broaches.
Bottle with pipette thru cork, for alcohol.
Sterile cotton, 1 ounce (canal dressings).
Absorbent paper points.
1 pair dressing pliers No. 2 (Buffalo).
Medicine glasses.
Medicine bottles.

EXCLUSION OF MOISTURE.

Rubber dam holder—8-Wizard.
Rubber dam weights.
Rubber dam punch (Perfected).
Rubber dam clamp forceps (Universal).
Spunk.
Bibulous paper.
Absorbent cotton.
Absorbent pellets.
Cotton rolls.
Rubber dam clamps—18-26; 138-139-201-206-211.
Ivory 1-8-24.
Ivory Imp. Adjustable cervix.
Special third molar, R. & L.
Special, Root R. & L.
Hatch cervical.

Cotton holder No. 1 Raper.
Waste holder No. 6.
Waxed floss.

POLISHING AND FINISHING.

Strips.
Disks.
Wood points.
Rubber cups, 1-2.
Stiff brushes.
Leather wheels.
Moosehide wheels.
Mandrels—303—Morgan-Maxfield; Morgan-Maxfield, R. A.
Orange wood sticks.

Cast Inlays:

1 Burnisher and trimmer.
1 pair R. & L. trimming knives.
1 casting ring, sprue and former (Taggart).
1 box Taggart Wax.
Wax carver.

Porcelain:

1 pair K pliers.
1 pair Ball pliers.
4 Thompson burnishers, 3, 4, 5, 8.
2 Camel's hair pencils.

Scaling and Prophylaxis:

Black's set 14 scalers.
Scalers, 33-34-37-6.
Porte polisher, 307.
Porte polisher 307 R. A.

Dental Anatomy Technics:

1 Lowell pin vise.
1 Boley millimeter gauge.
1 Pocket lens—(2 glasses).
Carving blocks—ivory; bone; celluloid.
Wood blocks (small).
Grobet file, half round, 5 in. 1-2-3.

Surgical Case:

1 scalpel, 1½ in blade.
1 Tenaculum.
1 steel probe.
1 silver probe.
1 Grooved director.
1 Exploring needle.
1 pair Artery forceps, 4½ in.
1 pair Surgeons' scissors, 4½ in. straight.
1 pair Gum scissors No. 23.
1 Gum lancet No. 1.

Forceps:

10-15-18 R. & L.-65-150-151-222.
Elevators.
Chisels for Impacted Third Molars.
Hypodermic Syringe outfit.

Miscellaneous:

Dental engine—Cord; cable.
Contra-angle hand piece.
Instrument case.
Separators—Perry A, B, C, D, E, F.
Matrices—Ivory Retainer-1-8.
Steel matrix strips.
32 Gauge copper.
Carborundum stones and points.
Arkansas Stone, 6 inches

Burs:

Straight, contra-angle.
Round, 1, 3, 5, 7.
Inv. cone, 33½, 34, 35, 36, 38.
Fissure, square end, 57-58-60.
Fissure, round end, 57-58.
Finishing burs, 200-201-203-204-219-222-231-232-236-242-245-502-503-504-507-508.
Bi-beveled drills, 102-104.
Wire brush—for cleaning instruments (brass).

PROSTHETIC INSTRUMENTS.

Vulcanite Denture:

Plaster Bowl.
Plaster Spatula.
Impression Trays (upper 2-3-22).
Impression Trays (lower 3-15-25).
Snow New Century Occluding Frame.
Snow Face Bow.
3 Snow Bite-Locks.
1 box Pink Wax.
Wax Spatula.
Vulcanite Flask (large).
Flask Wrench No. 10.
Vulcanite File D. E. Half-round 8".
Felt Cone (large blunt).
Felt Wheel No. 2.
Brush Wheels No. 4, No. 20, No. 26.
2 Lathe Chucks.
Carborundum Wheels, 1½-¼" (grit B. & D.)
Crocker Lathe Arbor.
Mechanical Saw Frame.
Dozen each Mechanical Saws No. 00 and No. 2.
Gas Burner No. 12 and Spider.
18" of ¼" Rubber tubing.
½ lb. Modeling Compound.
3 sheets Sandpaper No. 1.
2 sheets Pink Rubber.
4 sheets Red Rubber.
1 bottle Shellac Varnish.
1 bottle Sandarac Varnish.
1 shaker Talcum Powder.
1 bottle Vaseline.
1 set Wilson's Vulcanite Trimmers (new.)
1 pair Plate Sheers No. 1.
1 Granite Pan (2 Qt.)
1 Book Articulation Paper.

Laboratory Apron.
Plaster Knife.
1 lb. Pumice.
½ lb. Prepared Chalk.
1 two Flask Vulcanizer.
½ lb. Yellow Wax.
2 Camels Hair Brushes.
Pad lock.
Plate Brush.
Chamois Wheel 2½".

ADDITIONAL FOR METAL DENTURES.

Flat Nosed Pliers, 4½".
Horn Mallet.
1 spool 36 gauge Annealed Iron Wire.
1 pair Pliers.
5 dwt. German Silver Solder.
1 piece 30 gauge German Silver Plate.
½ lb. 28 gauge German Silver Plate.
Plate File Grobet (half-round No. 3).
Box Crystal Borax.
Crown and Collar Scissors.
1 pair Imp. Hawk Bill Pliers.
Plate Burnisher.
Compound Blow Pipe.
Asbestos Soldering Block No. 2.
Borax Slate.
54" Rubber Tubing $\frac{5}{16}$".
½ lb. Special Asbestos.
3 lbs. Babbitt Metal (Haskells).
3 lbs. Counter Die Metal.
1 set of 2 Casting Rings.
1 can Calcar.
4" of ¼" Steel Wire.
12" German Silver Wire (16 gauge).
1 Wire Soldering Frame (4x4).
Pair Pliers No. 121.
Riveting Hammer B.
Pair Curved Plate Shears.
Pair Round Nosed Pliers, 4½".
Soldering Tweezers A and L.
Soldering Tweezers, long beaked.
Copper Acid Pan.
Sticky Wax.
Martin's Screw Plate (Holes No. 0 to 13); (Series B).
Draw Plate (Spec).
12" German Silver Wire (12 gauge).
12" German Silver Wire (16 gauge).
12" Stub Steel Wire (93-1000).
1 piece Aluminum Plate (16 gauge). (4x4).
1 piece German Silver (30 gauge).
Rat-tail Metal File, 5" No. 2.
1 stick Rouge.
1 stick Tripoli.
Ladle for Melting Metal.

ADDITIONAL FOR CROWN AND BRIDGE.

1 piece each of 28 and 30 gauge German Silver Plate.
Melottes Mouldine Outfit.
1 pair Ivory Cleavers (large); Metal Handles (Improved).
Pair Root Files (Metal Handles).
Benson's Contouring Pliers.
Hickory Stick 4" long ⅜x¼" tapered to $\frac{3}{16}$x⅛".
Plate Punch No. 1.
Three Crown and Bridge Trays.
Crown Articulator.
Crown Bridge Anvil.

ADDITIONAL FOR PORCELAIN.

1 Fire Clay Tray.
1 Glass Slab.
1 Porcelain Carving Instrument Double End.
1 piece Spunk.

The advisability of an attempt to adopt a standardized set of instruments should be passed upon by this body. It seems to the speaker that it ought not to be very difficult to at least bring about a ninety per cent standardization of the instruments that we use in our college sets. If we do this, it will mean that a greater uniformity in dental teaching in the forty-six schools of the country will result. It will also mean that when our students go out from each and all of these schools and into the Army service, they will have been taught reasonably uniform methods, and they will all be familiar with the instruments that the Government will be able to provide. This is a serious question from the standpoint of the manufacturers. The members of this committee have been appealed to by manufacturers, who are intensely interested in having this

done, and they are all willing to take chances on having those things in which they may be most interested cut off the list for the greater good of the dental profession. The manufacturers are having difficulty in getting skilled workmen and holding those workmen, and also in getting dental steel, altho all the steel used in dental manufacture is as a drop in the bucket compared to the other demands for war material. Anything we can do to relieve the conditions incident to manufacturing a supply of dental instruments sufficient for the need at this time, should be done. If this main principle can receive the support of the schools represented here, then a committee could be appointed which could have these tentative lists printed and sent to each school and within a reasonable period, they could be returned with comments from each school and a final list prepared from those corrected lists, following which the schools of the country could adopt a uniform set of instruments.

Dr. T. W. Brophy: The Government has already adopted a list for the Army. Has the list presented here ever been submitted to the Government?

Dr. Friesell: This work was originally taken up at the request of the Chairman of the Sub-Committee on Dentistry of the General Medical Board of the Council of National Defense and was finally approved, and the committee was instructed to go ahead with the work. Previous to that time, however, it was necessary to bring about some immediate re-organization of the instrument list in use in the Army. The existing list was not adapted to present conditions, and it differed so much from that in use in the Navy that when the manufacturers were asked to supply bids for the Army they found it necessary to bring about some immediate changes towards this end. But that was done very hurriedly and was not intended by those men to be permanent in character. Therefore this work was started afterwards, to first be adopted by the schools, and then, as soon as it could be done, to supplant the former and incomplete list now in use in the Army. As stated, that list was adopted on very short order, soon after the dental committee was appointed, and while it was an improvement on the pre-existing conditions, it was not supposed to be final in character.

DISCUSSIONS.

Eugene H. Smith, Boston:

Dr. Friesell has stated that the crux of his paper is the instrument-list. I am going to begin by discussing the title of Dr. Friesell's paper: "The War Duties and Opportunities of Dental Schools." In replying to a toast on "Opportunity," you may remember that the late Senator Ingalls said: "I knock unbidden once at every gate, if sleeping, awake; if feasting, arise before it is too late, it is the hour of fate." I feel that the dental schools, so far as opportunity is concerned, have been sleeping at the gate. War duties have simply stimulated the officers of our various schools to their duty, to the enlargement of dental education based upon a firmer foundation.

Dr. Friesell speaks, laudably too, of the work of our profession in securing the exemption of the dental student. Every dean of a dental school will, I think, bear me out in the statement that in the beginning of this war, so far as our students entering into active service was concerned, we were given to understand that the dental student would be treated in the same manner as the medical student—namely: exempted from service in the Army and Navy in order that he might be allowed to complete his dental education. It came as a great shock to most of us to find that the Government did not so intend it, that the dental student was not rated with the medical student. That caused

the dental profession to get busy, so to speak, with the results that the law exempting dental students was enacted. But in that great campaign for the exemption of dental students, I do not believe that we impressed the Federal Government that we were so remarkably well trained. It realized, no doubt, that we were giving good service and had been giving good service, but the services of the dental man were not deemed as necessary as were the services of the physician and the surgeon. It is doubtless true that the enactment of that law was brought about largely thru political influence. It was right that we should have such a law, but how much better we would feel if the dental profession had such standing that the law which applied to the medical student might have applied to the dental student as well.

Now, that is the opportunity we have had thru all these years, and war duties and activities have brought it closely home to us. In the face of that fact, does it not behoove us as educators to see that our dental students are better trained (and I mean more thoroly trained) in the medical sciences. There is no question but that American dentistry holds thruout the world an enviable reputation so far as it applies to the technical application of dental work, but as a profession we are woefully behind in the medical sciences which underly dentistry just as much as they underly medicine. And that leads me to refer, if I may be permitted, to Dr. Hoff's paper, "The Value of the Dental Library and Museum to Dental Teaching." Dr. Hoff admits that the library is not used as it might or should be used by the dental student. Why? Because the dental student, in his pre-dental training, has not had sufficient preliminary training to create the habit and the love of reading. That is where it should begin—in the preliminary or pre-dental requirements in our dental schools. Any man in any profession or walk of life who has had the advantages of a good collegiate course or even two or three years of collegiate work, has in most cases established the habit of reading, and he will read books and use libraries.

We all love to say, and believe it I suppose, that dentistry is a specialty of medicine. If so, why not educate our men as other specialists in medicine are educated? I feel strongly about this, and I have advocated at different times, that the proper training of a dental student is simply this: He should enter a medical school just the same as a medical student enters it, with the same preliminary training. He should take three years of straight medicine the same as students of any specialty of medicine other than dentistry, and then in his fourth year in the medical school he should elect dental subjects which the medical school should accept as work for the medical degree. At the end of four years, the course in medicine now being four years, he should receive his degree in medicine. He then should cover another year in dentistry. At the end of five years, having had two years in dentistry and three years in medicine, he should receive his special dental degree.

Now, that is the opportunity of the dental school, and it is high time we should grasp and put into effect that opportunity.

I have had some difficulty in getting medical men in my vicinity to agree with me in this matter, but am happy to say that a large percentage of them now look favorably upon it. And there is no question but that, if dental schools having a close connection with a medical department would work to this end we would establish a parallel course to the dental degree. The dental schools must necessarily continue for a time now, but in the end I believe it would result in the present system of dental education being abrogated from recognition.

Dr. Friesell speaks of the wounded being brought back to our shores after once the American forces have taken an active part in this terrible conflict. I have considered that and have wondered how much of this facial surgery, including fractured jaw, etc., we might have to deal with here. As it is now these men are not brought back to the base hospital for seven or eight days after they have received their initial wounds and have received only temporary dressings. And to consider that these men would be brought back here before they had received practically all treatment necessary does not seem to me possible. It seems to me that it would surely be unwise to take a man with a badly smashed up face, with multiple fracture of the jaws, etc., adjust splints and appliances, put him aboard a transport and send him back to America. I would imagine that in a rough sea these appliances might seriously interfere with the poor fellow relieving himself in case of seasickness, and disturb all that had been done for him in the hospitals at the western front.

It is a pleasure to us all to have Dr. Friesell tell us of the activities of the dental school at the University of Pittsburgh, with which he is connected. And along that line it might be perfectly proper and interesting to you, for me to say something about what Harvard school has done along that line. We have now at the Western Front something like thirty men in active service. And as a member of the profession it is a satisfaction to me to speak of two men that we sent over with the first Harvard unit in the summer of 1915: Dr. Kazanjian, the head of the clinic in the prosthetic department in the Harvard school, and Dr. Brigham, a recent graduate in high standing. The enlistment for that unit was for three years, to be followed with other Harvard units. At the expiration of the first enlistment of the first Harvard unit, we were asked by the British authorities if Drs. Kazanjian and Brigham might not remain. This request of course was granted and the two men are still at the Western Front. I think this is a tribute to our profession, and it is certainly a great tribute to these men. It is a source of real satisfaction that we were fortunate in being able to send two such men, and especially Dr. Kazanjian because of his skill in restoring to as near normal as possible an injured face or fractured jaw. So much have the British appreciated his work that they have built him a hospital and equipped it. You have all learned from the dental journals what he has accomplished there, and he has enlisted for the remainder of the war.

In regard to instruments, I was a little surprised to learn that this committee is still working for standardization of instruments for the Army and Navy, because I remember that so far back as last May I was asked to act upon a committee appointed from Washington, and to give my views in regard to the standardization of dental instruments for the Army and Navy. In fact, I was invited to go to Washington and remain there indefinitely—they seemed to think they had enough for us to do. I did not feel that I was needed in Washington, and I asked that a copy of the Army and Navy lists be given me, which I would revise. This they did, and I called at one time to my assistance the representative of the S. S. White Dental Mfg. Co., and at another time the representative of the Cleveland Mfg. Co., and we went over the list very carefully. In noting the instruments that have been accepted and were being used in the Army and Navy, what most surprised me was that a molar forceps that the Army thought suitable to extract the upper molar of a soldier did not seem to be the kind of molar forceps that the Navy thought suitable to extract the upper molar of a sailor, for I had supposed that the upper molars of soldiers and sailors were very much alike.

This condition was true of the instruments all the way thru. Therefore it seemed to me advisable that we should introduce to the Army and Navy a standard set of instruments. I sent my report in, what became of it I do not know. Now I am surprised that we are still, after ten months, considering the standardization of instruments for the Army and Navy.

In regard to the standardization of instruments, both operative and prosthetic, for the schools, I think it wise, because students are changing from one school to another more or less, and certainly the instruments which one school has caused him to procure should be accepted and used in other schools.

F. T. Breene, Iowa City:

Referring to the opportunities of dental colleges in the present crisis: one of the opportunities presented to dental schools at the present time is to teach loyalty to our flag and to our friends. We can also teach that those things that are within a man are those things that will come out of a man. We have an opportunity of making a mistake. The Government of the United States has permitted the dental colleges to admit students with the understanding that they should finish their courses before being called into the service. God forbid that the dental schools of the United States be made a harbor for slackers. There is an opportunity for this mistake in medical schools as well as in dental schools. We should keep this in mind as it is liable to leave a mark upon the professional schools if it is abused.

Just a few words in regard to the standardization of instruments. Altho it is desirable to standardize or classify instruments for certain purposes, and now if ever, is the time to do it because we will all join in helping to do everything we can for this objective, yet it is possible that it might be the duty of this Institute to standardize technical operations and they select the appropriate instruments. Standardize and arrange the work to be done, and then select instruments for that work. By so doing I believe we would reach the objective desired.

It was mentioned that it would be desirable to have more dentists for a definite number of men in the United States Army. When it is understood that the average practitioner would have difficulty in completing the work of any two patients in one day, it will be realized that the number of dentists for army service should be increased. You can see from this difficulty of handling an Army of three million men with one dentist for 1000 men.

In this connection there is another thing to consider from the humanitarian standpoint, and that is that we are at the point in dentistry where there will be a greater demand for dentistry, not alone for the army, but what is good for the soldier is good for the layman, and if placing the mouth of the soldier in condition makes him more efficient, the civilian will follow to increase his efficiency. This idea will grow, and with ninety millions of people who have never had dental work done the dental instrument manufacturer, as well as the dental profession, will have a problem that the standardization of instruments will aid in solving.

A. E. Webster, Toronto:

Referring to the opportunities of dental schools, this is a rare opportunity which I regret I am not prepared for as I did not see Dr. Friesell's paper before coming here.

I may say that the question of recruiting in the United States and in our own country comprises two distinct problems at the present time. With us, unquestionably it is at the present time a great problem to determine whether or not dental students should be exempt from combatant service. Comparing the population with the number recruited, (when we think, for instance, that in

Toronto, a city of less than one-half million people, 75,000 men have gone over-seas), the common good must come first, and it is a question to be considered whether we should harbor three or four hundred men in the dental colleges when such a large proportion of the population must go to the front. In the United States it is quite different. The proportion, for instance, of three million men now recruited to the total population is very much less than with us; but were it to become ten to fifteen million men, then it would be a question whether young men should remain in the dental schools or not. What would it avail in a short run if we should prepare for the future and be defeated before we get to the line? Take, for example, the food question: Should we have young men in college when sending such a large proportion of the population abroad? What shall it avail if we train dentists to take up the work two years hence and in the meantime starve? Those are problems which our government had to consider. You do not have to consider them at the present time, but undoubtedly if the war should go on these problems will be as serious to you as they are to us. We fully believe, with you, that in the future more dentists will be required than there are now, and that all the dental schools can do will not prepare enough men for the future. But it is just a question of how soon and how long. Three years ago we made a kind of bet that we could graduate, inside of eighteen months, men who would be of service in the war. Now we do not know but that we could take freshmen in and graduate them in time to be of service in the war. We do not know. We are not nearly so sure of the duration of the war as we were then. We may say that in our college we have run almost a continuous session since the war began, summer and winter, preparing men for home and over-seas service. And when we speak of opportunity, we did not start out with any definite notions about what we would do this way and that; we have been in the hands of the Government for now over three years, and we do not know from one week's end to the next what will happen. Up to the present time we have sent over-seas in the neighborhood of 125 dental sergeants. The Government has returned probably fifty per cent. of these to us now, for the purpose of completing their courses and to be of more service higher up in the dental profession. These men have been coming back to us ever since the first of October and are still coming as they can get boats, and I doubt not but in another month they will begin taking them away again. We are running seven distinct classes instead of four besides many extraneous ones. We are in the hands of the Government, filling the niche the best we can according to the conditions that arise. Conditions change from time to time.

With you, you do not need to take many recruits who require prosthetic dentistry or artificial dentures. We did not need to either at first but now we are glad to get anybody whether he has a tooth at all or not. And so it may be with you. We did not begin with the idea that our dentists would require to do prosthetic dentistry. We know now that we must train sergeants to do mechanical dentistry. So these men are being trained in our colleges and are then trained in the army service. What does this training of dental sergeants in the dental school mean to us in the years to come? Every man who has gone over-seas and acted as a dental sergeant, tho he was sent over-seas to do mechanical work, has at some time in his service over-seas been doing operative work under compulsion. These men will return to us undoubtedly with certain rights, and, in my judgment, every one of them will expect a license to practice dentistry in Canada. I should like to see some politician or some dentist get up and say no. To overcome that difficulty we have tried to get into the services of the pros-

thetic department men who have the matriculation standard, and then we would give them certain credit for work done over-seas, and in that way make educated dentists of them.

I just want to say a word in connection with the preparation of men for over-seas. In the beginning, the kind of dentistry that was required was just every-day dentistry—extracting teeth, making artificial dentures and filling restorations; in other words, making men fit to fight. That goes on in any country as it has with us for the first three to six months or eighteen months. Then comes the next step, the repair of the waste and returning it to the front as far as it can be made fit. All those who may be returned to the front are made fit in France or in England. Those who are totally unfit are returned to us, and among these are returned many of the smashed-up faces which must be cared for even for the plastic surgery and the prosthetic restorations. It is in that department that you will find work to do in the convalescent hospitals after your men have been in battles for some time. Some of these men will be returned in a very short time, others will be in a hospital abroad for six to eight months or a year before the plastic surgery can be completed sufficiently even to allow them to come home. We find thruout the hospitals in Canada thousands of men who have returned and are requiring plastic surgery, oral surgery, and prosthetic restorations. The latter are made temporarily perhaps in France or in England, and then the permanent operations must be made here. With us the attempt is to return men as soon as possible to civil life, and every man is given the benefit of the most skilled dentistry that can be performed—an entirely different kind of dentistry from that which is given the men before they go to battle. As quickly as possible we prepare men for the front, and then repair the waste afterwards as permanantly as possible. At the present time there is a new order: Our dental surgeons at home are now required to do very largely the extracting and prepare the men as far as possible for receiving permanent prosthetic restorations, when they reach the camps of England or France, so that there may be no delay in getting to the front. Conditions change and then we have to change. We do not know what Hindenburg will do next, and so our conditions change.

In regard to the standardization of instruments, I hope the time will come when we can have some kind of uniformity in instruments used, so that we will not be teaching at variance with each other. There is surely one best way and one best instrument with which to do the work.

H. M. Semans, Columbus.

Since the 6th of October I have heard the words "exempted" and "exemption" used in reference to dental students, and I want to stand corrected if I am mistaken in what I am going to say. I understand that our dental students who are 21 and over are enlisted in the Dental Section of the Medical Reserve Corps as privates, and that they are subject to call of the Surgeon General at any time. That is the way I understand the situation.

A. W. Thornton, Montreal.

I wish to refer to one thing that Dr. Webster said in regard to the exemption of dental students during the period of their training as dentists. I am not sure that the whole thing is not a mistake, and for this reason: We have found in some of the schools of Canada that many men, who have come to that country to escape certain conditions in other countries, are striving now to perpetuate the very conditions that they left in their own country. They have no country in fact, and it is these least patriotic men that are entering the medical and dental schools of Canada, disarranging our medical and dental faculties. They have come from other countries, and,

without becoming citizens of the Dominion, have become students in our colleges in order to evade military service. We can do nothing with them, while our native youths and young men, who are students, are being taken into the military service right along and have been taken since shortly after the war broke out. It is a mistake, and if there is any way to obviate it, it should be obviated.

In regard to the standardization of instruments, there is a more important thing—to standardize the men that go over. Some members here talk as if only the recent dental graduates were to go into the Army service. Every country that has gone into the fight has made mistakes, and when the United States entered we hoped that it was going to escape some of the mistakes that England, France, and other countries have made, but they have not escaped them all. But if the dental profession is going to stand shoulder to shoulder with the other professions and other men of the Army, they must send something across other than recent graduates, for these cannot establish there the standard that should be established. Therefore the profession of the United States should, if possible to do so, send men who have been in practice ten or fifteen years—men who have had the experience that only office practice or teaching practice can give them. If I had my way I would establish a committee in this country that would pass upon every man who asked for enlistment, and that would go to the teachers in the various schools and ask them to volunteer for service, knowing the sacrifices which they would be called upon to make. And then we would have men at the front of whom we would be proud. Many of the best men in Canada went, but there was not enough of that class, and it has become a saying in Canada that the Dental Corps has been a place for the misfits of the profession. Do not understand me as meaning that all the men who have gone are misfits, but all the misfits have gone, and you may have that difficulty to contend with.

In speaking of the rights of dental students who shall finally return to Canada after rendering professional service in the Army, Dr. Webster states that he would like to see some politician get up and say that these men should not receive licenses to practice. One of the members who left New York on heatless day and struck this community on meatless day, suggested that perhaps the time would come when there would be a wireless politician, in which event we can perhaps do something.

Major H. D. Arnold, Washington, D. C.

I believe it was on the program that I break into this discussion some time, and the raising of the question of exemption and one or two other topics seem to offer the proper opening.

The problem now up is a very important one, and this is the reason why the Surgeon-General has asked me to come here and confer with you as to the way in which we are to deal with it and get your help in its right solution. Whatever you may feel about the desirability of dental students not going into active duty at once, if we are using the word "exemption" let us use it with the understanding that it is merely a matter of convenience. There is in one sense the "exemption" of dental students, in that they get what is technically called now a deferred classification. Do not misunderstand it, however. They get that deferred classification *only* because and on the ground that they are in the military service. A point which is coming to my attention every day applies not to the dental student, but to the dentists who are of draft age. They, too, are eligible, under the provisions of the Selective Service Regulations, for deferred classification in Class 5,—the last class. A good many dentists have only looked so far, and expect to be exempted from the draft and left in civil life. They get that classification only because and on

the ground that they are in the military service of this country; and the regulations state specifically that it shall be granted on no other basis.

The question of what is done with the men who enter the military service in the enlisted reserve corps is a question of army expediency. If they can be utilized to better advantage one year, two years, or three years from now as dental surgeons than they can be today as dental sergeants or privates; if in looking ahead to the possible exigencies of this war we believe that in these early days of our work, as was pointed out, a different situation prevails from that which pertains in Canada today; if we can now afford to take some of these ten million men that are eligible for military service and save them and train them for the future; that is a legitimate thing to do in the military service. And for the present it is the policy of the Surgeon-General to allow dental students and medical students to remain in inactive duty in order to secure an education which will supply us with better educated and trained officers along dental and medical lines. We have no right to put those men in inactive service when their brothers are in the fighting line, *except* for military purposes. We absolutely have no right to create a class of privileged persons for the purpose of studying anything they please, when they should be serving in the Army. No such provision was intended or will be tolerated.

Your dentists who are graduated, who have received a training which is adequate for the purposes of the Army, on what basis can they claim inactive duty? At present they cannot. It may be that in some few individual cases their presence in a dental school as teachers of enlisted men may be a legitimate Army purpose, but there is absolutely no excuse that we can see why the graduate dentist of draft age should be left in inactive duty in general practice. If you will carefully read the instructions and regulations published by the Surgeon-General's office, you will see that point is covered and that graduate dentists of draft age will be called into active duty as soon after they enlist as their services can be utilized in the enlisted corps of the Medical Department. And we are not going to wait until they can necessarily be employed as dentists.

So much for the problem of exemption.

There has come up the problem of standards, and that is the real point that I am here for. It seems to me I could talk a long time on this subject, but I will be very brief. I think all you men representing dental schools, and the body of dental teachers, should understand the opportunity that is presented by this war. We have come to you for guidance. The Surgeon-General is obliged to prescribe certain regulations under which these selective service regulations shall be carried out. We are asked to see that they are carried out in the right spirit so that only the proper people shall be taken in and educated for Army purposes in this line. This undoubtedly brings up the question of standards—standards of schools, standards of admission requirements particularly, standards of course of instruction and standards of time. On these points we want guidance. We try to make it as simple as we can and we say that students will be approved for the enlisted corps from "well recognized" medical and dental schools. Now, what is a "well recognized" dental school, or what should a "well recognized" dental school be? That question the Surgeon-General would like to have the dental profession decide. You are the ones that are competent to decide it, and we believe that an appeal with this explanation will be followed by not only a patriotic, but an intelligent solution of that problem. To apply these rules fairly at the present moment we have to know what the right standards are, but to you comes the opportunity of putting dental education

and the dental profession on a basis to receive the recognition that you gentlemen are asking for. That is the war opportunity that is before you today. From the preliminary talk that I have had with some of your leaders, I believe that you are going to rise to that opportunity, that you are going to tell us the right solution of the problem as to what a "well recognized" dental school should be, and if you will, you will have our everlasting thanks and you will be rendering one of the biggest services not only to us in this war-time, but to the whole country in the time that follows the war.

Major W. H. G. Logan, Washington, D. C.

I only desire to speak briefly on the subject discussed by Major Arnold, for he has brought before you a very important question.

For a long time the members of the Dental profession, particularly those men who constitute the membership of the National Dental Examiners Association, the National Faculties Association and the membership of this Association, have been trying to reach a decision as to what constitutes a well-recognized Dental School and what constitutes the proper preliminary education that applicants should have who are accepted in Dental institutions, but up to the present time an agreement has not been reached on this important subject. However, with the declaration of War and the enactment of law, which permits Dental students of conscription age to continue with their studies, providing they are in attendance upon well-recognized Dental schools under such Regulations as shall be laid down by the Surgeon General, it naturally makes a demand that the Surgeon General have the information as to what schools are to be known as well-recognized Dental institutions, for he cannot permit the enlistment of students in the Enlisted Reserve Corps of the Medical Department for any other type of student from a Dental institution.

Therefore, if all those interested can, in cooperation with the Surgeon General's Office, reach an agreement with the Surgeon General's authorized representatives, Major Arnold, as to what schools are to be classed as "well recognized" Dental institutions, the War Department then will be able to restrict the enlisting of Dental students who are in attendance upon authorized Dental institutions.

There seems to be some misunderstanding on the part of some of you to the effect that a Dental or Medical student is exempt from military service when he enlists in the Enlisted Reserve Corps of the Medical Department, whereas, the facts are, that any student or dentist who enlists in the Enlisted Reserve Corps of the Medical Department is not exempt, but is then and there inducted in the military service subject at all times to be called to duty by the Surgeon General when and wherever needed.

In reference to the standardization of Dental instruments, Dean Smith stated that he thought this question was settled some months ago and, in a general way, that is correct, for the Army is not now asking that question. They are buying the instruments that they believe to be suitable for the purpose intended. However, on further consideration it is likely that changes may be indicated as war progresses, for the reason that the teeth requirements for our conscripted men in our next draft will be different than it has been heretofore; in fact, when the present supply table was made out it was not contemplated that there would be any extensive amount of partial plate work made in various camps, but conditions as they occur must be met.

However, this country will not accept at the present time for general military service a man unless he has a minimum of six masticating teeth, three above and three below, opposing, and three incisors,

above and below, opposing—the cuspid being counted as an incisor.

With reference to the acceptance of Freshmen students in the Dental schools, it would seem to me there is need to restrict the number to be accepted in each institution, for you cannot open the doors to every man who might wish to stay out of the Army and also all men who conscientiously desired to enter the Dental school. It would seem wise that each institution be limited to the number they can accept with reference to the average number they have had in actual attendance in the Freshman class during the past five years. Furthermore, you should drop from your institution every student who does not live up to his opportunity by making the proper grade to advance from one semester to the next or from one class to the next.

In regard to the present Senior class receiving commissions in the Dental Reserve Corps, I am of the opinion (and it is only an opinion that I am here expressing) that not one of the present Senior class will be permitted or needed in the immediate future to receive a commission in the Dental Reserve Corps, as the Department now has a sufficient number to care for the requirements permitted by law for an Army of over five million men.

Naturally, some of your teachers of military age, who hold commissions in the Dental Reserve Corps, will desire assignment under their commissions in the future, as will the Department desire some of them to give service because of their efficiency.

N. S. Hoff, Ann Arbor:

In the light of this discussion it seems to me that we are up against a very serious proposition. These gentlemen have thrown back upon every member of this teaching body the responsibility for the Dental welfare of our Army. What are we going to do about it? Are we to recommend for this service men who have been able to get our degrees only, knowing well that many of them are incompetent to render the service which we now know is required at the front? Are we to allow even unfitted practitioners to enter this service regardless of whether they are properly trained for these requirements or not? It seems to me that we are in a position where, if we do not help in this particular place, we are not loyal to the cause. In fact, it seems as tho it were a more serious matter than that: For when we knowingly allow incompetent men to go into responsible positions in the Army, we are in the same position we would be if we were to knowingly allow an enemy to enlist in our Army. This would be a very serious position for us to face. I for one do not want to be placed in that position. Isn't it true that we know more about our students than does anyone else? We have worked with them and know what they are ordinarily capable of doing, and are not we in position to advise our representatives in Washington as to the proper men to send over-seas into this great and responsible work? And wouldn't doing this faithfully, regardless of whom it affected, be the best way in which we could serve our country? We know that in some instances our students just barely get thru the course, they show little aptitude for this work, and especially no aptitude for the practical work they are liable to be called upon to do, and should we recommend men of that sort for positions of so great responsibility? I do not think so. We should recommend only those men whom we conscientiously believe will fill these positions with credit. It seems to me that it would be competent for this body to pass some resolution that will influence the executive officers in our dental faculties to seriously consider this matter and to be very cautious about the kind of men recommended to the officials in Washington for this service. Would this not be a good way to establish our willingness as helpers in a scien-

tific way in this great cause? If we are going to be honest and patriotic and serve our country in the best way we shall have to do this. If we cannot recommend recent graduates for this work, then let us say so frankly and encourage qualified practitioners to go, and place the recent graduates in the offices of those practitioners who are competent to do the important work for the men in the trenches. This seems to me to be the logical thing to do in the light of what we have heard here today.

F. R. Henshaw, Indianapolis, Ind.

I do not know whether I misunderstood Major Logan or not. If I did not, then it seems to me that the thing Dr. Hoff has spoken of is in a way being solved by the Department itself. I gathered from Major Logan's remarks that a training school for dental surgeons is being established at Fort Oglethorpe. As you all know, some of us at least clamored all last spring and summer with the hope of getting the establishment of a dental training school that would serve the same purpose as the medical training school. You know what they do at the latter. At Fort Benjamin Harrison, if I am not mistaken, the men came under commission. If they did not make good, if they did not qualify, they were removed. Certainly the Surgeon-General's office is capable of selecting a group of experts who can take these men and train them, and if they are not competent, if they do not show up with the necessary ability, remove them. That does not devolve upon the professors in our schools. It would be rather embarrassing for Dr. Hoff to say: Here are seven students, three of whom are not fit to go into the Army. But, on the other hand, Dr. Hoff would be glad if Major Logan were to say: I have tried this boy in this particular service and he is not competent, I am going to send him back home. And that is what Major Logan meant should be done.

I have personally tried in various ways to get somebody who could bring this about in our section. The Congressmen and Senators from Indiana, are now interested in the idea of a training school for the Dental Reserve Corps along exactly the same lines as the medical. We have not gone anywhere near so far, but I think it is being impressed now. I hope so, for it will solve the problem of only those men that are fit going across.

Dr. Henshaw: Is it not your idea, Major Arnold, that your committees or your instructors are the competent people to pass upon the qualifications of these men, rather than the examiners, we will say, in the various states? In your training school are not you prepared now to say whether this man shall remain with this particular regiment and go forward, or whether he shall go home or be put in some other place?

Major Arnold: It seems to me that the selective process is best. It is desirable that you shall sift the graduates first as best you can, sending those you believe fit to us; and we will sift again. Then you will have men in the Dental Corps of whom you will be proud, and the others will be sent back.

Dr. Friesell (closing the discussion): While the political wire may have been necessary at one important stage of the procedure, you can make up your minds that if the dental school men of this country had not analyzed the situation or foreseen it, and if five men in particular who are all in this room at this time had not spent six months of pretty hard work on the problem, we would not have had for the dental student that thing which some people misconstrued when we loosely applied to it the term "exemption." And being one of the five and having spent six months on the work, I feel that I am well able to judge what brought about most of the influence that produced the result. I want to say also that no dental school I know anything about, and no dental school men

that I know, ever asked or desired or suggested in any way whatsoever that dental students should be exempted, and no dental man that I know anything about wants dental students exempted. But there is a field for the dentist in the Army, and it is a very important field. If dentistry is important in civil life, it is just as important in the Army; or I might put it this way: If dentistry is important in civil life, it is more important in the Army, because the man in the Army must live in conditions which, considered from the physical, mental and nervous standpoints, far exceed in untoward influences those conditions which the individual in civil life must meet. We have relatively a thousand men who can go into other lines of Army service, for one man that can go into the dental service. Why should we, in our inexperience or in our ignorance, take the one man who is partially educated along this line of work and put him in a place where we can put a thousand men who can do that work as well as he would do it? You can make a good fire out of mahogany, but you had better use something less expensive, and that has been the basis of the Army dental situation. Very few dental students have asked for exemption or wanted exemption, and if some provision had not been made by the Government to hold these men and to give us an opportunity to convince them that they were doing a bigger thing by carrying on this work than they would by going off to enlist, our dental schools would have had very few dental students. Before the Government took any steps that made it seem that dental students would be given an opportunity to eventually get into the service in the line for which they were best trained, at our University we started these men at military training so that they might feel they were doing something. If it had not been for that, fully ninety per cent. of our men would have enlisted; in fact many had enlisted and we had to bring them back from the cantonments later.

Personally, I would much prefer to have certain kinds of dental work done by men graduated in the last year or two, than by most men who have been graduated ten years. Furthermore, I see nothing in what I have termed the plain-line, every-day dentistry required in the Army, that the man recently graduated cannot do and do properly, and if he cannot do it properly he had no right to be graduated. True, he cannot do it as rapidly as the man who has had more experience, but if he has one thousand men in the Army to take care of he will soon acquire sufficient experience to be able to do the work rapidly. He is better fitted, he has not the family and business obligations that men longer in practice have. Therefore I think the proper thing to do is to take the young men and put them thru a course of preparation for some special lines of work that may develop in military dentistry, the system that must be followed out under those conditions, and also for the purpose of checking these men up to see that somebody has not gotten in thru sympathy or slipped in thru a hole in the sieve that should have kept him out. Of course, each of us can speak only for our own men. But I want to say here with all earnestness that I do not know a single man in this section of the country who has gone thru that sieve into the Army that we are not perfectly willing to stand back of, for we know he will give a good account of himself. We do not need to worry about the young man being able to "deliver the goods."

In regard to the taking of teachers, that is a serious matter. If the Government believes that we must train dentists, if it feels that the men who are training these dentists have the proper conception of their patriotic duty and the intelligence to apply it to the situation, then it ought not to have any doubts

as to who we let into our schools. And if we are to take these men and train them, we cannot do it without our teachers. If you take from our faculties the all-time men, then you might as well take our students. And there is no use talking about our getting older men and putting them on the faculties to teach our students, for we cannot bring the older men in and have them teach the classes we have today. There are not enough of the older men with proper preparation who can teach modern dentistry efficiently, who can teach the classes of men that are coming in now with the preparation that is required. If you try to take men who have been in practice ten to twenty years, you are going to make a failure of the whole thing.

I believe the proper thing for the schools to do is to indicate who on their faculties can be spared, and to also indicate those who cannot be spared. Those men who are honestly, in the minds of the executive officers, accomplishing more for the country in their capacity as teachers than they could do as dentists in the Army, should be left in service. If you let them go you might as well take half the students along with them.

There is a body composed of men who are familiar with existing conditions that has been laboring for years in establishing what are the proper standards in dental education, known by most of you as the Dental Educational Council of America. It has the ideas, the experience and the information upon which to establish these standards and upon which to classify schools, and this can and will be done very shortly by that body. In fact, their warning has gone out and the schools know that within a few months the standards will be fixed, and then the Surgeon-General's office will have something to go by.

One point which Major Arnold tried to stress as the most important point, the one point which held back this paper until the last moment, was the matter of standardizing as far as possible a sensible and desirable list of instruments used in our schools. Major Arnold believes that this is an important feature which should be taken up at this time, and would like to have the support of this body in that work. He asks that a committee be appointed to go at the work seriously, take it up with the individual schools and be prepared in the near future to recommend a standard set of instruments which it seems to him should meet at least ninety per cent of the requirements of the schools. A careful study of this question has been made. Two-thirds of the schools could adopt the recommended lists now, and those schools are teaching practically uniform methods. And if two-thirds of the schools of this country (to be definite, 31 of the 46) have taken up a certain method of work and have found it sufficiently good to adopt it, then it seems to me that the other fifteen schools with fifteen different methods ought to investigate what the majority of the schools are doing and adapt their work to that standard.

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PROGRESS OF THE YEAR IN THE INVESTIGATION OF MOTTLED ENAMEL WITH SPECIAL REFERENCE TO ITS ASSOCIATION WITH ARTESIAN WATER.

By Frederick S. McKay, D.D.S., Colorado Springs, Colorado.

(Read before the National Dental Association at Its Twenty-First Annual Session, New York City, N. Y., October 23-26, 1917.)

WITH the publication of an article on Mottled Enamel, under joint authorship of the late G. V. Black and your grantee (Dental Cosmos, May to August, inclusive, 1916) the examination of afflicted territory was thought to have been completed, at least until some new district should be brought to light which might present some particular reasons which would make its examination of value to this investigation.

It will be recalled that the article as published in the Dental Cosmos, described several afflicted districts in Colorado, another in Texas, two in Virginia, several in Arizona—upon some of which certain Indian Tribes, notably the Pimas, presented an endemic percentage of practically one hundred,—and other scattering districts in the Northwest, regarding which we have nothing more than suspicious evidence. The data presented in the article was not conclusive, but certain facts were established, which at least pointed the way to further investigation.

The serial publication of the article had scarcely been completed before I received a report from Dr. O. E. Martin, of Britton, South Dakota, that a well defined district, in which this lesion of the enamel was very prevalent, was located adjacent to, and including his locality; and with this, the astonishing information that the existence of the lesion was limited to individuals who had been raised on artesian water. The significance of this association with artesian water will be apparent when it is

recalled that, as shown in the Cosmos Article, the enamel lesion is found in direct relation with artesian water at Franklin and Courtland, in Virginia, and Amarillo in Texas, while in a less direct relation in Alamosa, Colorado.

It might also be proper to note here that at the Pictou and Chandler coal camps, in Colorado, a very pronounced affliction exists in association with water drawn from the shaft of the mine, which because of the depth from which it comes, might be considered as artesian water. That this assumption is justified, I hope to show later in this article, in tracing the geologic origin of the artesian water in the South Dakota basin.

An examination therefore, of this newly outlined district, was considered justified, and was undertaken early in October, 1916, the results of which I now aim to present in a somewhat detailed manner.

The physical characteristics of the endemic districts heretofore described, have varied thru an almost inconceivable variety. We have found these districts on the great plains, adjacent to the foothills of the Rocky Mountain Range; in the high metal-mining camps; at the entrance to some of the canyons piercing the mountain range; in desolate and barren coal-mining camps; in the timbered mountain defiles and passes; in the green meadows of mountain ranches; in the broad inland parks and valleys of mountainous country; on the coastal plain of the Atlantic Seaboard, not over forty miles from the ocean shore; on the plains of the Texas Panhandle; on the sun-baked desert in Arizona and Old Mexico; in the Italian littoral adjacent to the volcanic district near Naples,—and now, we are about to study a district situated in the broad and fertile plains of South Dakota.

Examination of Britton, South Dakota and Vicinity.

The occurrence of this lesion at Britton and Vicinity, had been noted by Dr. O. E. Martin continuously during his practice there for the past ten or more years, and the one fact that had impressed him in trying to determine the cause, was that the lesion made its appearance subsequent to the time when the community began the use of artesian water as the principal source of its domestic supply, after 1898; and he noted further that those native individuals who had passed thru the period of enamel growth prior to the introduction of artesian water had normal enamel. That this fact is well established I hope to present proof by photographic evidence and carefully gathered histories later in this article.

The fact that the children born about the time at which the artesian water began to be used, and later, presented an affliction of mottled enamel of practically 100%, was borne out by an examination in the schools. In detail the findings were as follows:

NATIVES.

Enamel	Water	Number
Normal	Well	4
Mottled	Artesian	78

NON-NATIVES.

Enamel	Number
Normal	55
Mottled	0

The distinction here to be observed is that the *native* children represent, so far as this lesion is concerned, the influence of, or at least association with, artesian water, except the four found with normal enamel, who had been raised on well water.

On the other hand, the *non-natives* represent an association with water from other sources, particularly during the period of enamel formation.

Reduced to a concise statement, the children who had been raised on *artesian* water had *mottled* enamel, while those who had been raised on *other* water had *normal* enamel.

One of the facts that was amply demonstrated in the article published in 1916, was that enamel that was suffi-

ciently complete in its development, retained its normality, or was not affected by the peculiar influence acting in an afflicted locality if the individual subsequently became a resident of such locality; and the additional fact that any enamel in process of development at the time residence was established in an afflicted district, would at once become affected by the damaging influence, and would upon eruption show so sharp a line of demarcation, even upon individual teeth, or would show so marked a difference in appearance in the different groups of teeth, as pointed out by Dr. Black, as would enable the experienced observer to say closely at what age the individual came into the afflicted locality.

Let us see now, if this be the case with reference to the district we are studying, by examining some individual histories.

	Name	Enamel	Use of artesian water commenced at age of
1	Leslie C.	(First group normal (Second " mottled	at 6 years
2	Harry N.	(First group normal (Second " mottled	at 3 "
3.	Ernest B.	Normal	No artesian water used
4	Emerson H.	"	at 14 years
5	E—— P——	"	at 13 "
6	Sarah W.	"	at 6 " not much used
7	—— R.	"	at 11 "
8	Mabel J.	"	at 6 "
9	—— Roehe	"	No artesian water used
10	Ella P.	"	at 15 years
11	Marion J.	(First group normal (Second " mottled	at 3½ "
12	Grace J.	(First group normal (Second " mottled	at 5 "
13	Melvin S.	(First group normal (Second " mottled	at 6 "
14	Bertha P.	Normal	at 11 "
15	Elsie C.	(First group normal (Second " mottled	at 5 "
16	Gracene J.	(First group normal (Second " mottled	at 6 "
17	Elsie B.	Normal	at 8 "

Note: First group of teeth includes incisors, cuspids and first molars.
Second group of teeth includes bicuspids and second molars.

Attention is called to the similarity between numbers 3, 4, 5, 6, 7, 8, 9, 10, 14 and 17, in that little or no artesian water was used, or the age was sufficiently advanced before commencing the use of artesian water, that enamel formation was complete beyond possibility of damage, except possibly the third molars in some cases. This might be the case in numbers 8 and 17, while on the other hand, cases like these two have been found in other endemic districts, to show damage to the second group of teeth.

We should not fail to consider, in tabulating these conditions, the difference in the amount of enamel development in the two groups of teeth, varying in different individuals of the same age, without departing from what we might term a correct average. Such a variation might possibly account for the case of Harry N—in whom the first group was normal and the second group mottled, the use of artesian water having begun at the age of three years. In the average instance we might expect the first group to show the lesion to some extent under such conditions.

The Cosmos article pointed out the inhibitory influence that the removal of

a native from an afflicted district exerted upon the manifestation of this lesion, which is borne out in the case of Geo. H., who was born in Britton, moved to Canada at the age of two years, returning to Britton at the age of ten, and who presented normal enamel. If any damage had been done to the first group of teeth prior to his removal, at the age of two, it had evidently been repaired in the new environment, or at least future normal enamel development was assured and all enamel made safe, except possibly the third molars.

A somewhat similar case was that of a child who removed from Britton at the age of five years to another part of the State, supposed to be non-endemic, and returned to Britton at the age of ten,—showing the second group of teeth mottled. It is presumed that the difference in development of this group of teeth in these two individuals at the same age, with almost the same kind of migration, would account for the difference in results.

It has been shown during the progress of this investigation that the temporary teeth in all endemic localities, were invariably free from this lesion, but a curious exception appears to have been found at Britton. Wade H— gave a history of bottle feeding after the age of six months, the food having been diluted or mixed with artesian water, and the temporary teeth showed a distinct mottled appearance. Whether the supposed cause and effect acted conjointly to produce this peculiar result, is a matter for conjecture.

Another interesting exception was that of a child who, being native to Britton, had avoided the use of the city artesian water and had been restricted to the use of a water that has been regularly marketed in the locality, from a spring adjacent to the town, and who had normal enamel. The city artesian well was sunk in the year 1898, primarily for fire protection, and few mains were laid. The water was not pleasant to taste and was not used generally for domestic purposes at first. A few cases of typhoid fever supposedly caused by the use of shallow wells, helped to bring the artesian water more into general use, and as the town became able to afford it, the mains were extended from year to year and piped into the houses, and the shallow wells abandoned for the artesian water, which was considered to be germ free. Before sinking the artesian well the people depended entirely on shallow wells, dug or bored from 20 to 50 feet in depth. The pressure from the artesian well was at first 120 pounds per square inch, but has since dropped to about 60, due no doubt to the continued use and the various other tappings of the underground reservoir in the vicinity.

In presenting photographic evidence of the existence of this lesion in this district, I will call attention to the fact that no matter in what part of the country it has been found to exist, it always takes on the same characteristics of appearance, and is distributed upon the same areas of the teeth in a typical fashion.

Figures 1, 2 and 3 require little comment, except to say that they are all typical of conditions found in that city.

Figure 4 illustrates a girl of about 16, who was born at Britton after the introduction of artesian water, and had used this water continuously and exclusively. The teeth show in general, the characteristic whiteness, with pronounced staining of the labial surfaces of the upper incisors, the stain being distributed in characteristic fashion.

No other teeth nor surfaces are stained, which is also characteristic. Pits are seen on these same surfaces, and faintly upon the cusps of the bicuspids, upper and lower, which is also characteristic.

Figure 5, an adult sister of the previous illustration, was also born at Britton, prior, however, to the use of artesian water, and was raised upon water from a shallow, or "dug" well.

Figure 1.

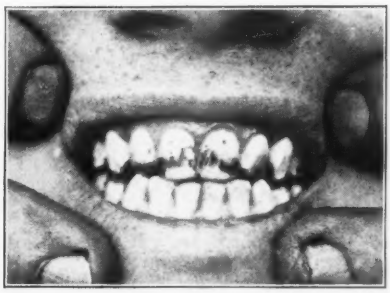

Figure 4.

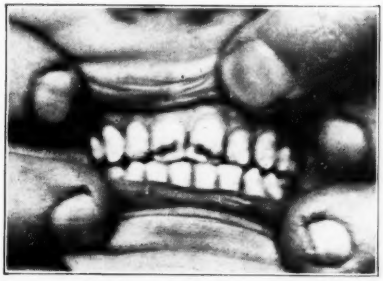

Figure 2.

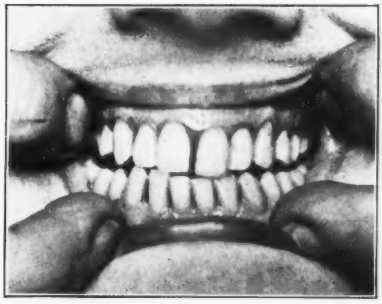

Figure 5.

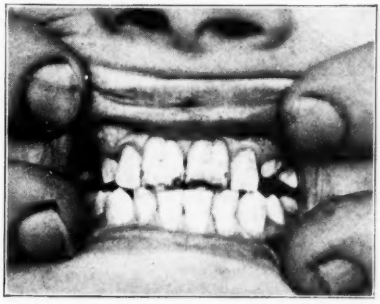

Figure 3.

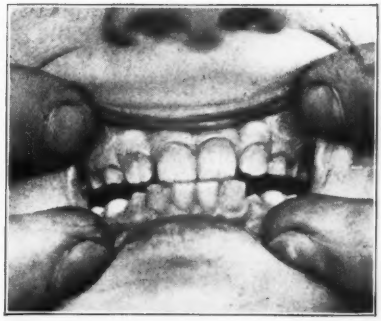

Figure 6.

The enamel of all her teeth was grown in exclusive association with the use of shallow well water, and its absolute normality, of freedom from this lesion, is well illustrated.

Figure 6. This illustration shows a child about eleven, L— Hamilton, whose enamel on the permanent incisors is perfectly normal. This child is one of five, all born on the homestead where now living, and all having normal enamel. It seems that because of their dislike for the taste of the artesian water, it was not piped into the house, the family preferring to continue the use of the 52 foot well in the yard, which had been in constant use for 28 years when our examination was made.

Another interesting bit of evidence relating to the influence of this same well is furnished by the A— family, who were also among the early settlers and lived on the property adjoining the Hamilton place. Two children were raised there with constant use of the Hamilton well, and have grown normal enamel.

Examination of Kidder, South Dakota.

This small community is adjacent to Britton, a few miles to the north and east, and its topography is very similar to that of Britton. An examination of the school children revealed the following:

Native children presenting *mottled* enamel, 17.

Native children presenting *normal* enamel, 0.

Non-Native children presenting *mottled* enamel, 0.

Non-Native children presenting *normal* enamel, 6.

Twenty-three of the twenty-nine children examined are here accounted for, the remaining six being unclassified because of lack of permanent teeth or doubtful histories.

Like Britton, the water used for several years, is practically all artesian, both in the town and on the adjacent farms, about as many of the children seen coming from the farms as living in the town.

Fig. 7 shows a case found at Kidder, and is typical in many ways, particularly in the symmetrical location of the stain upon the upper central incisors. All the enamel is characteristically mottled.

The next five illustrations are introduced as being of intense interest, and as contributing the most conclusive evidence bearing upon the etiologic influence of the water, that it has so far been my privilege to present during this investigation.

Among the cases found in the school at Kidder were two brothers, Richard and Elbert Hardina (twins), who are illustrated in Figs. 8 and 9 respectively.

My readers will readily agree that any influence that operates to produce such havoc and destruction of the dental organs in childhood, as has been produced in Elbert's case (Fig. 9) is worthy the resources of our Research Institute to discover.

I need not describe this case further than the illustration shows, except to say that the rest of the teeth, not shown in the picture, are as badly damaged. What prospect has this boy of ever enjoying the normal use of a dental apparatus or of escaping the total destruction of the dental organs long before middle life?

Richard's condition (Fig 8) is less marked than that of his brother, but the effects of a destructive influence of some sort is only too plainly apparent.

A moment should be taken right here to contrast this phase of the lesion in which the teeth present every appearance of having been subjected to a corrosive action, with what might be called the "smooth" type, such as is illustrated in Fig. 7 which was grown in the same community, and presumably produced by the same influence.

By far the most typical manifestation

Figure 7.

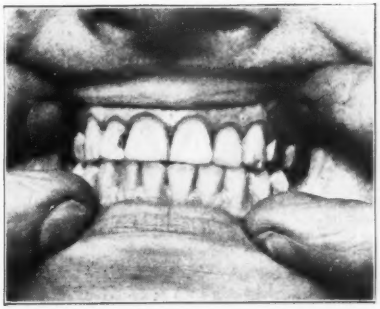

Figure 10.

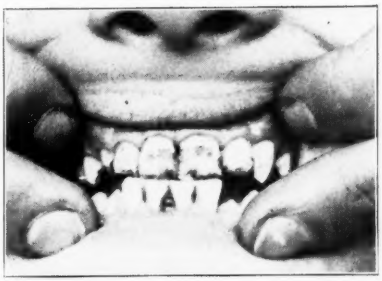

Figure 8.

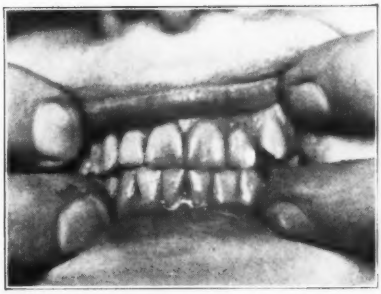

Figure 11.

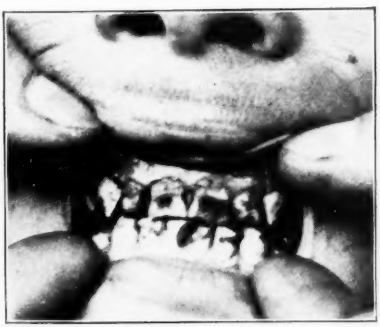

Figure 9.

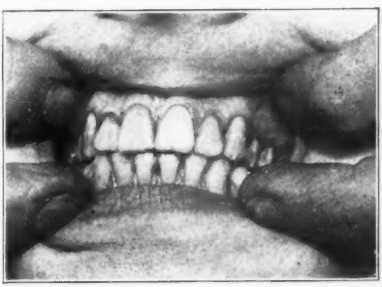

Figure 12.

is the "smooth" type, which has been abundantly illustrated in previous articles—(Dental Cosmos May, 1916.) (Journal N. D. A. March, 1917)and in which the enamel presents the same glazed and unbroken surface as does normal enamel.

These two boys were immediately marked for further study, and later that day the home on the farm at the outskirts of the town, was visited, and the following history obtained.

EXAMINATION OF THE HARDINA FAMILY

The artesian well was sunk in 1906 and extends to the usual depth (about 1300 feet) for that locality. Prior to this time the domestic supply was obtained from a shallow well dug in the yard, the location of which is still visible, altho it has been filled in for several years.

Six children were born and lived to maturity on this farm, and presented evidence as follows:

Frances, the oldest child, was born in 1892, consequently was 14 years old when the artesian well was sunk. Her enamel is normal, as shown in Fig. 10, except that the third molars are pronouncedly and typically mottled. The explanation of this has been carefully given in my previous articles, so will not be repeated here.

The second child, Mildred was born in 1894, so was 12 years old when the artesian well was sunk. Her enamel is normal, as shown in Fig. 11, except the third molars, which were typically mottled.

The third child, Mrs. F., was born in 1895, so was 11 years old when the artesian well was sunk. Her enamel is normal as shown in Fig. 12 excepting again, like the two older sisters, the third molars, which were typically mottled.

These third molars were covered with such defective enamel that they were practically destroyed by decay before being extracted by Dr. Martin. (Figure 13.)

The broken edge of enamel in No. 2 shows its unorganized character, and No. 4 gives an idea of the "dead white" color of the tooth.

The fourth child, another daughter, Anna, whom I did not examine, was born in 1901, hence was five years old when the artesian well was sunk. Dr. Martin states that the first group of teeth is normal, but that the bicuspids and second molars are typically mottled, which condition of things is exactly what would be expected in similar circumstances from previous experience in the various endemic fields.

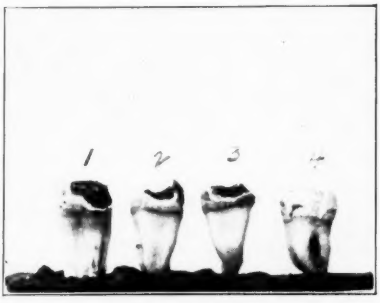

Figure 13.

The two twin boys, (Figures 8 and 9) were born in 1906, the same year the artesian well was sunk, hence all their enamel was grown in exclusive association with the artesian water, and the results are only too evident in the illustrations.

If such evidence as this, so clear and straightforward, that the use of artesian water in that territory is in some way accountable for the disturbance in the structure of the enamel, cannot be considered as conclusive, then, pray, what sort of evidence shall we collect?

EXAMINATION OF HAVANA, NORTH DAKOTA.

The State line dividing South from North Dakota, is crossed just before coming into the town of Havana, but

the general characteristics of the country remain the same, except possibly that it is a little more rolling. Havana is, like the places previously examined, an agricultural district.

An examination of 21 pupils in 7th and 8th grades in the school, gave the following data. Eighteen of them were native to Havana; and of these fifteen had normal enamel, and had been raised on shallow well water. The remaining three had mottled enamel and had been raised on artesian water, two of these being in the same family (Mapes) living on a farm about three miles out. The significant fact here is that this community has avoided the use of artesian water, the residents depending upon the water from shallow or dug wells, and coupled with this circumstance, from the standpoint of this investigation, is the fact that the children have escaped this lesion of the enamel. Three children of the 21 examined were not native to Havana, and had normal enamel.

The conditions found in this community just described, are certainly in utter contrast with those found in Kidder and Britton, and so far as the examiners were able to determine, the only difference was in the character of the water supply, total immunity from the lesion existing where artesian water was not used, and universal existence of the lesion where artesian water was used.

Examination of Langford, South Dakota.

In considering the extent and outlines of the artesian basin over which the foregoing communities are located, I will, later in this article, show that its general direction extends north and south, and the examinations were continued thru those towns to the south which were known to be afflicted, following the line of the branch railroad which joined the main line of the Chicago, Milwaukee & St. Paul at Andover, South Dakota.

Twenty-four native children were examined in the school of whom twelve showed *normal* enamel, having been raised on *well* water, and twelve showed *mottled* enamel, having been raised on *artesian* water. Two non-natives were seen, whose enamel was normal. No non-natives were seen who showed the lesion. Seventh and eighth grades only were examined, in order that only those children who were free from temporary teeth would be seen.

Examination of Pierpont, South Dakota.

In the seventh and eighth grades and High School, were found thirty-nine children, of whom twenty showed *normal* enamel, having been raised on *well* water, and nineteen showed *mottled* enamel, having been raised on artesian water. Four non-natives were seen who had normal enamel. None of the non-natives showed the lesion.

Examination of Andover, South Dakota.

No tabulation was made of the examination of the children in the school, but a casual search revealed an abundance of evidence exactly in conformity with the previous examinations, namely, that this community had a high percentage of affliction among its natives, and that the occurrence of the lesion was absolutely associated with the artesian water, which had been in use in the town for many years.

Examination of Groton, South Dakota.

Various other communities, located in adjacent districts, not easily accessible, were brought to light during these examinations, as being possibly suspicious territory, as far as this lesion is concerned, but the examinations were continued by turning west at Andover, along the main line of the railroad.

The school at Groton showed the same association of artesian water with mot-

tled enamel, and immunity in association with well water. At the same time it was noted by the examiners that there was here beginning a slight change in the character of the data obtained, in that there was some element of confusion in the histories of the children as given. There had been more of a mixture of various waters at different periods of enamel growth, and the results upon the teeth did not follow with the same constancy as had been observed in the other afflicted towns.

To illustrate: many children who had had artesian water since early life, even since birth, would show only the second group of teeth (bicuspids and second molars) mottled, while the first group (incisors, cuspids and first molars) appeared normal. Apparently some item in the environment was at variance with the other typically endemic districts.

Examination of Aberdeen, South Dakota.

The examination was concluded at Aberdeen, which is the chief center of population in that part of the State. Being a City of, I should say, about thirty thousand people, there is necessarily met a vast diversity of environment, which introduces bewildering confusion into the collection of such data or facts as are of value in the investigation of a problem like this one.

This very circumstance seems to indicate the wisdom of devoting the major part of the study of the present year, to those smaller areas and isolated spots, in and upon which the secret of the problem lies hidden within a very circumscribed space. However, much valuable information was secured by observing conditions in this city.

An examination of a large group of children in the principal school, demonstrated that the endemic percentage in the present generation is high. A very confusing feature in conditions was the fact that in certain parts of the city "neighborhood" artesian wells, say one to each city block, had been sunk to supply some of the inhabitants of the block. I learned there were from seventy to one hundred of these private "soft water" artesian wells thruout the city, of about 1100 feet depth. In general, however, the source of supply was from the municipal well or wells, as I understood there was, or had been, more than one.

Information received from city officials, was to the effect that the first wells were sunk about 1884, and delivered what was spoken of as "soft water." These wells went down about 900 feet, and evidently tapped a body of water of limited size, as they "played out" or were exhausted after a few years of use and municipal growth. Then, about ten years ago, deeper wells were sunk, going down to 1300 feet, bringing what is called a "hard" water.

In trying to understand the use of the terms "hard" and "soft" as applied to water, it is necessary to point out that these terms apply to the action upon soap, the "soft" water lathering freely, and the "hard" with difficulty. An artesian water may be either "hard" or "soft"—and so may water from a shallow well. It is the "hard" artesian water from the deeper flow that is in general use at the present time.

The fact is, that in a large group of children seen, those having mottled enamel invariably stated that they had used the city artesian water constantly since birth, or early childhood.

Thru the courtesy of Dr. Schweiger I had opportunity of making an interesting and significant observation of a lady, born in Aberdeen and raised on the water from the first artesian wells sunk, which I described as "soft." Her enamel is normal, while that of her children, raised upon the present water from deeper wells, described as "hard," have the typical mottled enamel. Certainly this instance, which I am sure could be duplicated many times, must be granted as indicating that some influence has

made its appearance in later years in this community which accounts for the existence of defective enamel in the present generation, which was absent in the previous generation. If not the

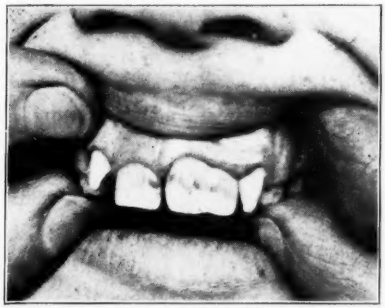

Figure 14.

change in the character of the water, what?

An examination was also made of a group of pupils at the State Normal School at Aberdeen, at which young adults from various parts of the State

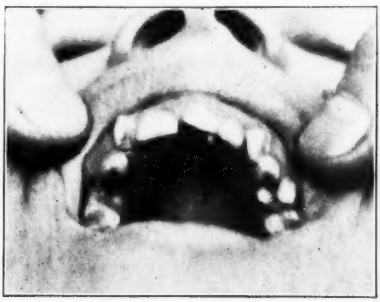

Figure 15.

were in attendance, but no other suspicious territory was brought to light.

Figures 14, 15 and 16 are introduced to illustrate a curious anomaly found in a boy in the Aberdeen School. Besides being mottled, the left Central and Lateral Incisors are fused, a pronounced cingulum being present, (Figure 15) the roots being separate as shown in the X-ray. (Figure 16.) Another permanent lateral incisor is present on the same side and the temporary cuspid.

A Study of Artesian Water in General, with Particular Reference to the Basin Underlying South Dakota.

The evidence presented by the examinations of these Districts in South Dakota must make it plain that there is a relation most definite and conclusive existing between the use of water drawn from these artesian wells during the

Figure 16.

period of enamel growth, and the existence of the enamel lesion. It certainly seems more than a coincidence. Since this is the case, then it would seem most important to investigate the extent of the artesian basin, determine the source of the water, and most important of all, determine its chemical ingredients. I find upon reference to the publications of the United States Geological Survey that a great deal has been published concerning this artesian district, as a result of the examinations made by the Geologists of the Survey, several years ago, long before any such properties as these waters seem, by this investigation to have been shown to exist, were thought of or considered possible.

In order that we may have a more

definite idea of what is meant by the term "Artesian" as applied to waters, I quote from Bulletin 44 issued by the Bureau of Economic Geology, University of Texas (Udden & Baker.)

"All underground water is derived from rainfall. It may be classified as non-artesian and artesian. The latter is water under hydrostatic pressure. Artesian water may flow when reached by the drill, or it may escape in springs, or it may be non-flowing, rising to a greater or less depth in the well. Water in the deeper wells is more thoroly filtered and usually more highly mineralized than the surface waters. The mineral matter is taken from the rocks by the water in its passage thru them. Generally speaking, the farther the water travels underground, the more highly mineralized it becomes. Thus it is that some underground waters are usable when they are taken from near the area where they are derived from rainfall, while farther away from the area, they are unfit for use."

In a "Preliminary Report on Artesian Waters of a Portion of the Dakotas" by N. H. Darton, extracted from the 17th Annual Report of the United States Geological Survey, 1895-6, I find much of interest bearing upon the origin of these waters.

In this report, the geological features of North and South Dakota are declared to be relatively simple, being uniform over very wide areas. This is in direct contrast to the geologic features of the Rocky Mountain district, where so many of the endemic areas are located, the strata here being, in places, literally turned up on end, making their comprehension difficult to the layman.

In gaining some idea of these water-bearing areas in the artesian district, it is necessary to consider the geology, at least briefly.

Various layers, consisting of gravel, sands and clays lie between the surface and what is known as the Dakota sandstone, which has proven to be the great water-bearing layer. This sheet of Dakota sandstone underlies practically the entire State, but as it extends westward, it curves upward and comes to the surface with the edge turned upward, just at the border of the great Rocky Mountain Highland. This feature is diagramatically shown in its westernmost extension only, on account of lack of space, in Figure 17.

Darton in this report, describes what the diagram shows, in these words: "From its outcrops in the Black Hills (and Rocky Mountains), it sinks deeply beneath the surface, and then gradually rises to the eastward. It finally abuts against the crystalline bed rock along the Eastern border of the State, at no great distance beneath the surface, where its waters are more or less free to escape, and the eastern limit of the basin is determined. The waters have a head which is relatively great to the westward, but gradually diminishes to nothing at the eastern border of the basin. There are wide areas in which this head is sufficient to give surface flows in artesian wells, but, on the other hand, there are many thousand square miles which are too elevated for artesian flows." He names as one of these "elevated" regions, the eastern Coteau in South Dakota, which is of some interest from the standpoint of the data collected in that district during our investigation.

Figure 18 shows the extent of the artesian basin and the area covered by our examination can be recognized by starting at Aberdeen and following east thru Groton and Andover, thence north thru Langford, Britton and just over the North Dakota line to Havana, which is not shown in the map.

The special point just here, however, is that the basin is seen to stop just east of Britton, at which point rises a series of low hills, referred to by Darton as the

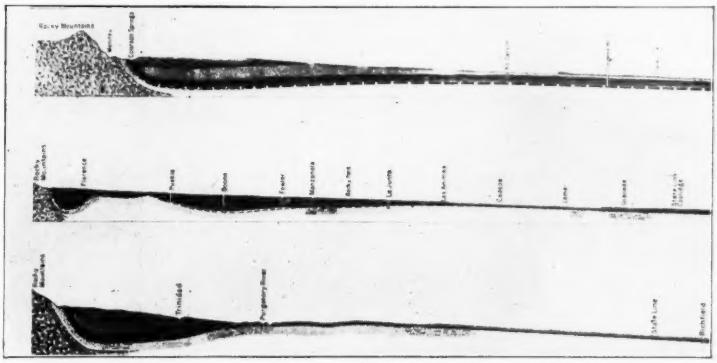

Figure 17.

Westernmost extension of Dakota Sandstone Sheet, showing its upturned outcrop adjacent to Rocky Mountain Range. Sandstone Layer is one of the dark layers near bottom.

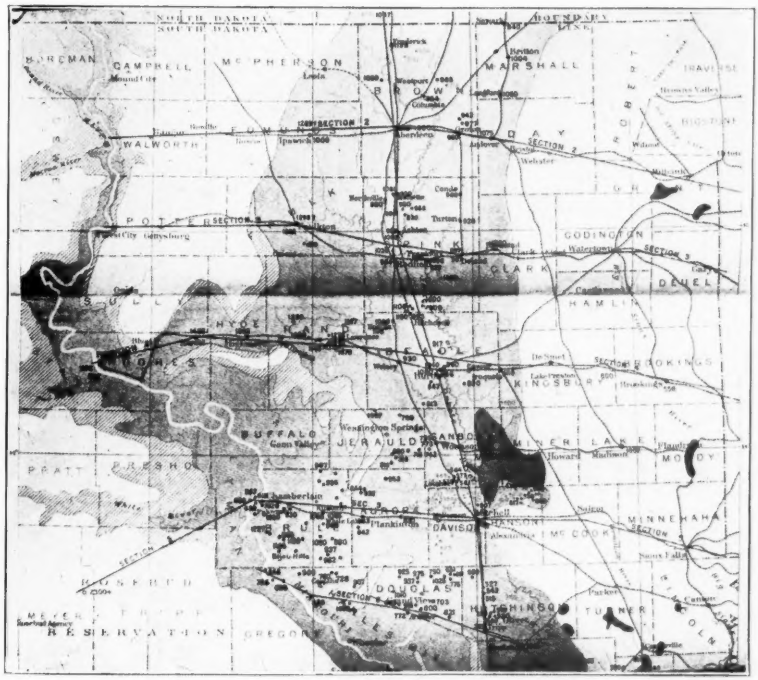

Figure 18.

Map of Artesian Basin in South Dakota. (Darton—U. S. Geol. Survey.)

"Eastern Coteau," but spoken of locally as the "Hill Country."

Dr. Martin stated particularly that no cases of mottled enamel had been observed in, or coming from this "Hill Country," and I recall having observed several persons who had come from there who had normal enamel. All gave a history of having used spring water, and no borings in that district had been successful in obtaining a flow of artesian water.

Relation of the Waters in the Artesian Basin of South Dakota to the Rocky Mountain Region.

It would seem a far cry to try and connect or relate the water delivered from an artesian well in Eastern South Dakota with water originating on the Rocky Mountain Range, but evidence contained in several of the reports of the Geological Survey by Darton and others, seems not only to bring this into the realm of possibility, but to show conclusively that such a relation exists.

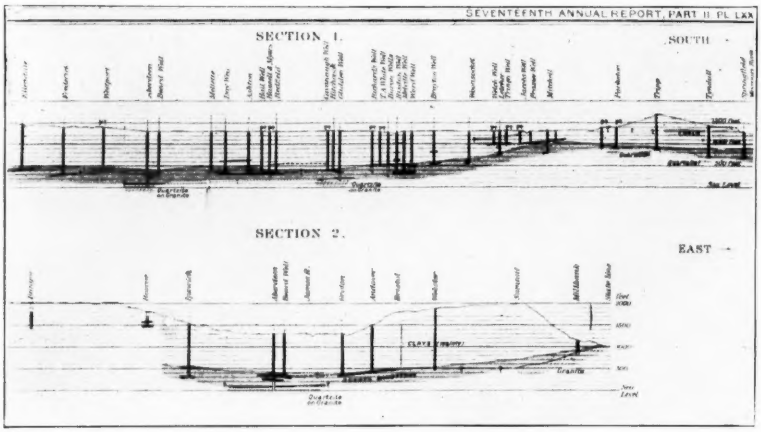

Figure 19.

Darton makes it clear either that the limit of the basin had been reached, or that the elevation of the land was so great that the depth necessary to reach the flow would be too great to be practical, the attenuated head of pressure which the water would have at that distance, being insufficient to bring it to the surface.

Fig 19 is a diagramatic representation of different well-borings reaching down into the Dakota sandstone layer to obtain the water flow, showing also the elevation above sea-level of the land surface at which the boring starts.

Figure 20 shows in the darker areas, the western outcrop of the Dakota Sandstone in regions adjacent to the Rocky Mountain Range, and immediately into well known districts endemic to mottled enamel.

Origin of the Artesian Waters.

The head or pressure that the artesian water has, must, according to physical laws, indicate that they originate in a region of much greater height or altitude above sea level than that of the artesian basin, and in discussing this question of origin Darton does so in this way in his Preliminary Report before quoted:

"There has been considerable speculation as to where the waters pass underground, but most geologists agree that the waters in the Dakota beds pass beneath the surface in the elevated region adjoining the Black Hills and Rocky Mountains. In these regions the Dakota beds are upturned and reach the surface (See Figure 20) so that they are accessible to the waters over considerable areas. In these outcrops the formation consists of sands and porous sandstones, and much of the water that comes in contact with them is absorbed. The underlying formations are also more or less permeable, particularly the limestones, which are often cavernous, so that beneath the great mantle of clays lying above the Dakota (Sandstone) beds there are receptacles for large bodies of water, which, when they once have passed underground, are kept down by these impervious overlying materials. Altho studies of individual streams in their passage across the Dakota (sandstone) and underlying formation in the Black Hills and Rocky Mountains have not in every case yielded definite results as to the amount of the water which sinks, yet it is clearly apparent that many of the streams diminish in volume before they pass out under the plains. * * * * * In the foothills of the Rocky Mountains there are many examples. As these waters enter the Dakota (sandstone) beds at altitudes upward of 3000 feet above sea level, we can readily understand the reason why the pressure is so great when they are tapped by wells in the relatively low lands eastward."

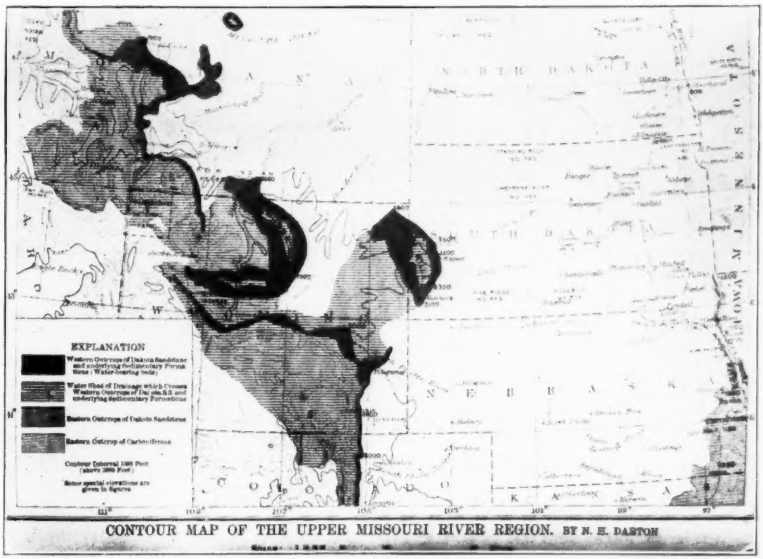

Figure 20.

On this point Darton says further: "Part of the surface water passes into the sandstones in their elevated outcrop zones along the foot of the western mountains and flows east thru the permeable rocks, in most cases finally escaping in springs in the low level areas

of outcrop eastward and southward. In such water bearing strata as the Dakota (sandstone) and underlying beds, which are overlain by a thick mass of impermeable deposits, the waters are under great pressure, for the intake zone has an altitude of from 4,000 to 6,000 feet and the region of outflow is only from 1,000 to 1,200 feet above sea level. The existence of this pressure, as found in many wells in eastern South Dakota, is the strongest evidence we possess that the waters flow underground for many hundreds of miles."

It is probably true that were artesian wells sunk directly into the Dakota Sandstone in districts not far to the eastward of the Rocky Mountain Range, the same character of water as that obtained in the South Dakota wells would be encountered, "but the steep dips rapidly carry this formation to a great depth, so that it is beyond the reach of practical well-borings."

Outcrops or Exposures of Dakota Sandstone in Colorado.

Darton, in his "Preliminary Report on the Geology and Underground Water Resources of the Central Great Plains" (Professional paper No. 32, U. S. Geol. Survey) gives elaborate and detailed descriptions of the extension and appearance of the Dakota Sandstone in various places adjacent to the eastern border of the great Rocky Mountain Uplift, and in going thru this material I find frequent instances where this formation thrusts itself up into the very heart of some of the well known and previously described endemic districts; but I wish here to attach no special significance to these circumstances, but to present them as evidence that this investigation seems entirely justified in assuming that this immense sheet of Dakota sandstone receives its water thru these upturned edges adjacent to the Rockies, and that this water finds its way eastward thru subterranean channels, to be tapped and released thru the artesian wells of South Dakota.

It is indeed a curious and unexpected phase of our inquiry in which we can construct the hypothesis that some unknown factor in the waters originating in the Rocky Mountain Range produces this lesion in certain adjacent localities, then the waters sink underground, travel at a great depth to the eastward and again rise to plague with this persistent influence, the children of man in unsuspecting communities at these distant points.

In regard to the origin of these waters, Darton has further to say (in private correspondence): "The artesian water of Eastern South Dakota undoubtedly passes underground in the Black Hills and Rocky Mountain slopes. It travels east at a rate of about one mile a year, so that about two hundred years may be required for the transit. The water at the places you mention all comes from the "Dakota" sandstone, which supplies all the artesian wells in the State, excepting a few shallower ones from a higher sandstone in the Mitchell region. The Dakota sandstone, however, is composite, with higher and lower flows from different sandstone members, and these flows differ considerably in chemical composition altho for that matter there are many differences in composition in the same flow at various places."

This helps to explain why so small a portion of the entire artesian districts (see Map Figure 18) is afflicted with mottled enamel,—practically only the northeast portion, as Martin, with an extensive acquaintance with the rest of the State, finds little knowledge of the existence of this lesion outside the vicinity examined, altho with the attention called to this condition by this investigation, it is altogether possible that a larger part of this artesian basin will be found to be afflicted. It should be remembered, however, that it is only since the building of the western extension of

the Chicago, Milwaukee and St. Paul Ry. from Aberdeen, a few years ago, that that section of the State has been favorable to population and the rearing of children to an age when mottled enamel could make its appearance. Martin recently reports that indications have come to him showing that this lesion is making its appearance in that newer section of the State, which when more fully settled, may be found to be of high endemic percentage.

Darton continuing, says that "The beds thru which underground waters pass vary in character from place to place, so that it is very natural that the waters from different beds and at different localities should vary."

Entering into such an inquiry as we have, concerning artesian water and its source, the natural question is whether the artesian water in other endemic districts previously described, comes from the same source.

The City of Alamosa, Colorado, in the San Louis Valley, has been described (Dental Cosmos, June, 1916, "D" page 641) as having about 50% affliction of native children, and the principal source of municipal supply is artesian. Located as it is, surrounded by the various ranges of the Rockies, there can be little doubt as to the origin of this water.

Amarillo, Texas, was also described as having a high percentage of affliction, and it also is an artesian district. (Dental Cosmos, July, 1916, "A" page 786).

The source of this water is at present not known, but Prof. Todd, then State Geologist of South Dakota, states the following (Geology and Water Resources of a Portion of Southeastern South Dakota, 1900): "Those who have studied the matter, universally agree that the main artesian supply is from the sandstone and sand beds of the Dakota formation. This remarkable formation is the source of water in Texas and Colorado, etc. It owes its efficiency to four conditions: (1) Its great extent, underlying most of the Great Plains from the Rocky Mountains to about the ninety-fifth meridian. (2) Its highly elevated western border, located in the moist regions of the mountains and crossed by numerous mountain streams. (3) The fact that it is extensively sealed in its eastern margin, by the overlapping clays of the Colorado formation, and where that is not the case, by the tile sheet of the Glacial epoch. (4) The excavation of wide areas, especially in (South) Dakota, by older streams so as to bring the land surface below the pressure height or "head" generated by the elevated western border of the formation."

Fragmentary Evidence of Other Endemic Regions.

Dr. Arthur G. Rand, Nantucket, Mass., states that "in certain parts of the Azores and Cape Verde Islands, off the West Coast of Africa, this condition exists, mostly in a race of people called the Brava, and that their teeth are nearly the color of their faces," meaning, I presume, that they are a colored race.

These Islands, being possessions of Portugal, I have tried to get into touch with avenues for further information thru the Portugese Legation at Washington, thence at Lisbon, but conditions in Europe and on the ocean have, for the present, prevented.

It is also possible that certain districts in western Minnesota, just east of the artesian basin of South Dakota, share the same conditions, due possibly, to an extension of the basin. Such a condition was reported by Dr. M. Williams, from Wheaton, Minn., by letter in the Dental Cosmos, February, 1917. The report is of doubtful accuracy, however.

Definite report, however, has been made (Transactions of Panama Pacific Dental Congress, San Francisco, 1915) in discussion of a paper by myself, of an afflicted district at Bishop and Benton, California, which are located in the east central part of the State. I have

not been able to get any further information from this district and feel that a detailed examination would later be warranted.

Other Artesian Districts Suspected of Being Endemic to Mottled Enamel.

Certain other publications of the United States Geological Survey (particularly—Ground Water in San Joaquin Valley, California—Mendenhall; Dole and Stabler) indicate that parts of this region are to be looked upon as bearing, from the standpoint of character and source of the water supply, suspicious evidence of being endemic to mottled enamel, but without examination or other clinical evidence from the district, no facts are at hand.

Certain other artesian districts in Colorado have recently come to my notice, which, according to my best information at present, received their flow from the Dakota sandstone. It may be of importance later, to determine by examination, whether mottled enamel exists there.

The Relation of the Artesian District in Virginia.

My readers will probably not need to be reminded that, as reported in a previous article (Dental Cosmos, June, 1916, page 643) mottled enamel was found associated closely with artesian water at Franklin and Courtland, Va. It is important therefore, that the same careful chemical examination be made of that water, in comparison with the analyses of related waters from the other districts.

An Endemic Region in the Bahama Islands.

By far one of the most interesting phases that this investigation has assumed, is finding this lesion existing in this group of Islands, located in the Atlantic, about 200 miles east of Florida.

This was brought to my attention by Dr. G. H. Johnson, of Nassau, on the Island of New Providence, one of the group. He describes conditions as follows; "I have observed the conditions described by you, in several islands of the Bahama group, while other islands are free from any trace of such trouble. Every person, white and black, whom I have seen from Rum Cay and Watling's island, is afflicted, to a greater or less degree, and nearly everyone from Ragged Island. On some of the islands near these, the trouble is sometimes seen to a slight extent. The Northwestern islands of the group, viz.: Abaco, Eleuthera, New Providence and others, are free from any trace, except in fishing villages on Eleuthera, from which I have seen a few mild cases." (See map, Figure 21.)

Dr. Johnson sent me two teeth, extracted from a colored person who was born and lived until sixteen years of age on one of the Islands (Rum Cay)—upon which this trouble is prevalent.

Figure 22 is introduced principally to illustrate this lesion as it appears in the Bahama Islands (Nos. 4 & 5) showing a pitted or "corroded" condition of the enamel. (Teeth furnished by Dr. Johnson.)

It has been stated before that this lesion always assumes the same typical appearance, varying only in degree, regardless of the geographical district wherein it exists, and this illustration bears out the statement and argues the same cause, operating in the same way upon the enamel structure in the various endemic districts.

To continue, however, with Dr. Johnson's description: He describes a boy of 19 years from the same Island, whose teeth were even more discolored, even the second molars being pitted and discolored.

Because of what has been said regarding the water in other districts, let us consider this question in the Bahamas. Dr. Johnson says: "The water is obtained from wells of a depth of 5 or 6

feet. The water contains a large proportion of lime which it gathers after falling, by filtering thru the limestone of which the islands are formed. This fresh water in the wells, rests upon the salt, or ocean water, which is in the rocks, rising and falling in the wells, with the tides. Being rain water, the wells are at a lower level in dry seasons, but the tidal rise and fall

If this be the case, then it argues that if the water be the cause of this lesion, it is because of something it takes from the soil, since water which does not come into contact with the soil (rain water gathered into tanks) is unassociated with mottled enamel. If the date presented in this paper has been considered conclusive, these conclusions might seem to have been shattered by the conditions

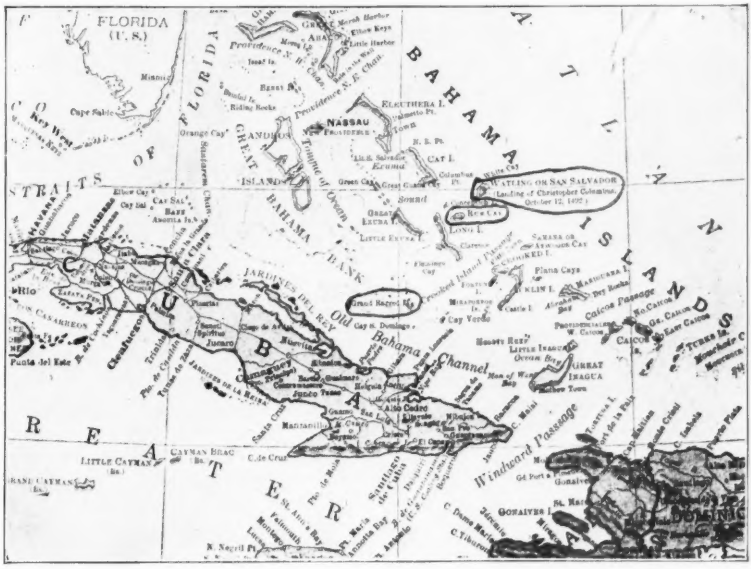

Figure 21.

Map of Bahama Islands.

is noted in all seasons. Further; if much water is taken from a well the water which flows in to replace it is much "harder" (that is, higher in mineral content) than that which has been taken out, and the water returns to its original degree of softness after the well has "rested." On a few of the islands, spring (meaning 'well') water cannot be obtained; here the water supply consists of rain water caught and stored in stone tanks. On these islands I have never seen a case of mottled or stained teeth."

just described in the Bahama Islands, for it is difficult to understand what relation can exist between water obtained from the shallow wells in these limestone coral islands, in the ocean, and that flowing from the Rocky Mountain Range, hundreds of miles underground, to supply deep artesian wells far in the interior of the country. Undoubtedly it strengthens the attitude we have taken in directing the study of this problem, that the only way a solution can be

reached is by a most careful comparative chemical determination of the waters.

This would be a difficult matter in these Islands, inasmuch as they are not easily accessible, and because the means of communication among the several afflicted and immune islands, is limited to small sailing vessels at irregular intervals. I believe, however, that the data secured by a close examination, would prove extremely valuable and conclusive, after this investigation has reached a point where such data could be correlated with what had previously been determined.

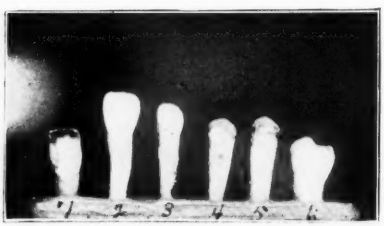

Figure 22.

Mottled teeth from various districts, as follows: 1-3-6, Colorado; 2, Texas; 4-5, Bahama Islands.

One of the difficult features in the study of this problem has been the great distances which had to be traveled in order to personally inspect these widely separated districts, to guard against error.

A Consideration of the Influence of the Ductless Glands Upon the Calcification of the Teeth.

Of late years medical literature has been dealing more and more extensively with various dystrophies that have been found to be dependent upon disturbed functioning of these ductless glands, and various references to abnormal dentitional conditions are to be found.

Inasmuch as we may later find that our lesion can be brought into a closer relationship with the disturbances just mentioned, and also because such a relationship is already believed to exist by many whose opinions are usually accepted with deference, it is necessary at this time to give this matter at least brief consideration.

So far as I can at present observe, this relationship is based upon two groups of circumstances: (1) The occurrence of malposed and malformed teeth in individuals who also exhibit marked gross physical evidences of various kinds, illustrative of disturbed secretional function. (2) The occurrence of teeth that are themselves more or less grossly malformed or undeveloped, and found either in individuals similar to those mentioned under (1) or in criminals in whom certain glands, usually the parathyroids have been experimentally removed.

Perhaps these effects upon the teeth have not been recognized to the full extent, or less imperfectly observed, but the fact is that I find in a limited examination of such literature, including recent books, however, very meagre reference to disturbances of the dental structures.

In considering endemic cretinism, Krantz reports that in an examination of thirty cretins in an institution, he found "numerous anomalies of the jaws, retarded teething, besides factors that give occasion to anomalies of the position of the teeth." (Ductless Grandular Diseases Falta—Meyers.)

Certainly such evidence as this cannot be considered as anything but incomplete and inconclusive. It would be easy to duplicate such findings in almost any group of institutional children.

Describing his findings further, he mentions "alterations of the structure, defects of the enamel, hypoplasias and erosions, and very frequently caries."

Erdheim's observations upon rats, after the parathyroid glands had been removed, described changes in the structure of the enamel, and even defects in the enamel.

In brief, I cannot but conclude that none of these defects or alterations of structure as described in recent texts, are any different than those gross defects of enamel and dentine that have been long recognized and formerly spoken of as atrophies, but post-humously named by Black "Contemporaneous Accretional Deformity" or "Lineal Deformity," which he describes as a "deformity occurring along the lines of accretion, contemporaneously in all teeth in process of development during a period of malnutrition." (Mottled Teeth, etc., G. V. Black, Dental Cosmos, February, 1916.)

Following this thought it is easy to see that were the period of malnutrition continuous and prolonged thru dental development, as would be the case in the glandular disturbances, then gross deformities of the teeth would be the result expected.

If mottled enamel were the result of glandular dystrophy, it would seem reasonable to expect to find the other typical symptoms at least among the natives of the various endemic localities, but such is certainly not the case insofar as our present knowledge goes. Given a district wherein the percentage of mottled enamel among natives is actually 100, would we not reasonably expect at least an appreciable proportion of these to show some signs of glandular disturbance, if it were the real factor?

The one circumstance connected with glandular dystrophy that exists in common with mottled enamel, is its sharply defined geographical location in various parts of the globe.

I find in Falta's Book certain statements bearing upon the distribution of cretinic degeneration, that are worth quoting. In certain parts of Europe, "especially in the Central Alps, large goitrous districts exist; also in other parts of the earth the goitre districts lie in mountainous districts, and these districts change; localities that were formerly infested become goitre free, and conversely."

Interesting instances are given of families whose children born outside the goitre districts were healthy, but those born in the goitre districts had goitre. There is an element of similarity between such a circumstance and the behavior of mottled enamel. He states further that "enormous outbreaks of goitre have been often observed in regiments after their stationing in goitre districts."

The authorities on this subject seem to have concluded somewhat definitely that the cause of this condition is in the water, altho at present undetermined, and the following quotation gives the basis of the theory:

"The noxus of goitre is found in the drinking water. In the goitre territory there exist indeed especial goitre brooks; there are numerous examples in the literature of goitrous communities becoming free of goitre after they had established drinking water conduits from goitre-free vicinities." (Falta.)

This has a familiar sound to us in this work on mottled enamel, and we recall the instance of LaFayette, Colorado, which has produced immunity from mottled enamel by changing from shallow wells to mountain water, while per contra, in the Virginia field the change from shallow wells to artesian water has brought affliction; the same is true in South Dakota. Verily we seem to be dealing with a sword of double edge.

The unknown noxus of goitre is not filterable, and is destroyed by a temperature higher than 70 degrees C, which brings the conclusion that it is likely it is not a miasma but a toxin or toxalbumin from an organic substance. This might suggest that the hidden factor for which we are searching in our problem is a toxic or a bacterial element which has heretofore not been thought to be the cause.

So far as organic factors are con-

cerned, it should be remembered that in some of the water analyses previously published, there was hardly a trace of organic matter. However, if in this cursory argument I might seem to be trying to discredit the glandular hypothesis, I wish now to consider the views of Prof. John E. Greves, of Utrecht, Holland, who is decidedly of the opinion that thyroid disturbance, or at least underlying constitutional factors, will be found to contain the solution of the difficulty.

After having received from me some specimens of mottled teeth, he states

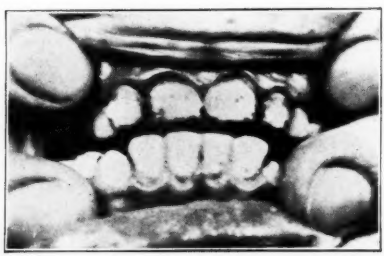

Figure 23.

without reserve that he is familiar with the same condition in Holland, except that the brown discoloration is not so common, and he sends the following photograph (Figure 23) to bear out his assertion, altho this case has also the stain. The boy is a native of Utrecht.

Hardly a day passes, he states, that they do not see these cases in the clinic at the University of Utrecht.

Speaking of the water, he says that the drinking water used at Utrecht is noted for producing goitre, and that frequently students have to discontinue their courses and leave on account of it. He finds it difficult to believe that the drinking of the water as found in the various localities in America, *alone* brings about mottling of the enamel, and thinks there must be a deeper cause, some constitutional condition, however slight, such as affections of the parathyroids particularly, or other glands giving out internal secretions that play an important role in our cases. He and his colleagues have been conducting a series of studies upon rats, and he furnishes me with the following photograph and description:

Group 1. "Rats fed on bread and water from the sand hills dune water—as is used in Amsterdam, only carbonic acid is added artificially in bottles. The Thyroid Gland is little changed. The teeth however, are very brittle, and several are broken during life. The parents were fed for three months on bread and also sparkling (carbonized?) dune water (from the sand dunes.) Microscopic sections of the dentine show abundance of inter-globular spaces."

Group II. "Rats fed on *unboiled* Utrecht water. Parents fed on bread and milk. After three weeks the young ones were given Utrecht unboiled water. The Thyroid gland shows enlargement as result of this feeding, and teeth are growing irregular with large inter-globular spaces in the dentine."

Group III. "Rats given *boiled* Utrecht water three weeks after birth. Microscopically the dentine is very irregularly formed, but the enamel shows not much difference. There is a very great enlargement of the thyroid gland and very much irregularity in the growth of the incisors."

"In comparing the teeth of these rats with those of wild rats, one is struck with the whiteness and absence of lustre."

This description resembles that of mottled enamel in the opaque whiteness, and if it be the same it is the first time to my knowledge that this lesion has been produced artificially in the lower animals. Grevers considers his studies therefore, only the beginning, and we may hope for future developments.

The great difference that I can see in the results produced by Grevers is that

gross or macroscopic alterations in the entire form and structure of the teeth have been produced, while in the lesion we have been studying, the dystrophy is confined to the enamel, and the alteration of structure is mainly microscopic.

Grevers however, upon receiving specimens from me, made a comparison with sections of mottled teeth from his own locality, and found, as he states, exactly the same conditions as those in the American teeth. In describing these he reviews Black's theory that the opaque white covering of enamel indicates a deficiency of the interprismatic substance, i. e. the enamel rods are not bound by a cementing substance.

He is not quite in agreement with this theory, for, he states he "has found that this outer part of the enamel (in the mottled teeth) is in the same condition that enamel is normally found before the teeth are erupted, while still within the bony crypts."

Continuing he says, "When I treat my slides (of the unerupted teeth) with coloring matter (Thionin) the outer part of the enamel takes up the stain, whereas

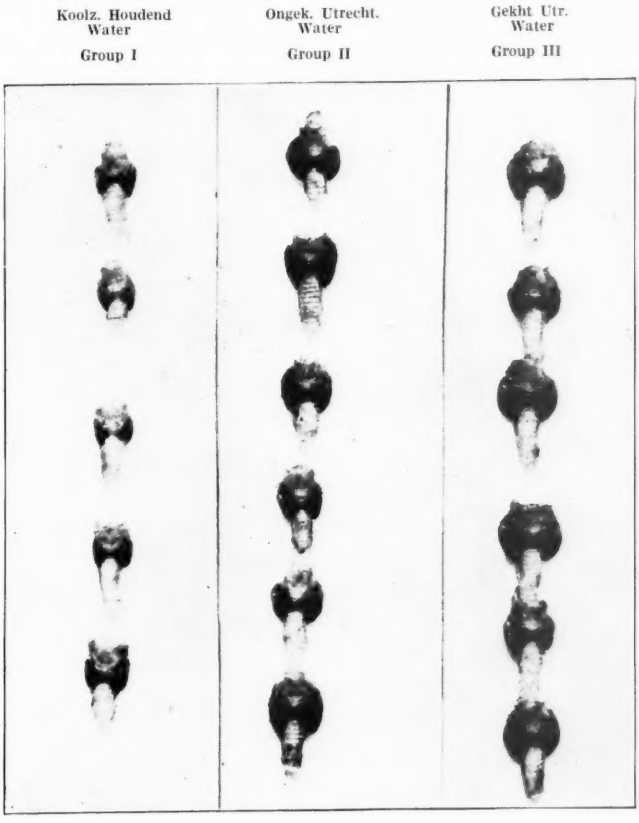

Figure 24.

the mature enamel (underlying) refuses the stain. This I find the case with immature enamel always, and now comes the interesting part of my investigation, viz.—mature enamel is negative (turns the light to the right) and immature enamel positive (turns the light to the left) under the microscope—using polarized light. This is exactly what I have found to be the case in my specimens of mottled teeth."

His conclusion therefore, is that mottled enamel is simply immature or not fully calcified enamel, and not an inherent lack of the cementing substance.

That this conclusion, coming from an investigator of Grever's experience, is worthy of our consideration, goes without saying, but be it as it may, the real problem remains unchanged, and that is to locate the influence which either prevents the maturing of the outer layers of the enamel, or else partially destroys this layer after it has once been fully formed. Which of these two hypotheses, if either, will finally be found to be correct, it is impossible at present to say.

Figure 25.

Further Evidence Showing the Existence of Mottled Enamel Among the Pima Indians.

As reported in Dental Cosmos (August, 1916,) the Pima Indians were found to be highly afflicted.

During an examination of the inmates of the Sherman Indian School at Riverside, California, made during the year by Drs. Ketcham and Gray, several cases of mottled enamel with the brown stain were found, every one of whom proved to be from the Pima Reservation in Arizona. Illustration of two of these are shown in Figures 25 and 26.

On the other hand, in an examination of over 4200 Indians of the Navajo and Hopi families, made by L. H. Curran, M. D., U. S. Indian Service, Moqui Indian Reservation, Oraibi, Arizona, over a territory of about 200 miles, he reports these Indians to be totally immune.

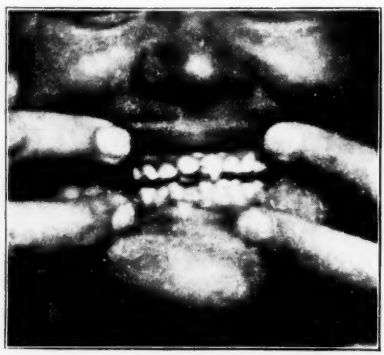

Figure 26.

He reports however, that among the Southern Utes, at Ignacio, Colorado, the condition of mottled enamel is very pronounced, which as yet has not been confirmed.

Additional Evidence Concerning a Probable Endemic District at Waco, Texas.

In Dental Cosmos (July, 1916, page 786) is illustrated a case native to Waco, Texas.

Dr. F. C. Watson, Lake Charles, La., reports a case coming under his notice who gives a history of having been born in Waco, and curiously enough, reports having been raised upon artesian water. The entire denture is mottled with stain-

ing of the upper incisors in the characteristic way. The case is illustrated in Figure 27.

A Critical Review of an Italian Investigation of "Mottled Enamel" Conducted Near Rome.

A Digest appearing in "Chemical Abstracts" (June 20, 1916,) drew attention to an article published in "Annali di Chimica Applicata," Rome, Italy (Vol. 5, 1916,) by Gasparrini and Piergili, under the title—"Decalcifying Action of Certain Drinking Waters on the Enamel of the Teeth in the Period of Dentition." Rome, December 1915, which describes a lesion of the enamel, the physical characteristics, and mode of occurrence of which leaves little doubt that it is precisely the same as that with which our investigation has dealt in various parts of the country.

A translation of the original article was prepared by Mr. Chas. A. Baldwin, of Colorado Springs, and in order that we may contrast the Italian view point with the larger field covered during our investigation in America, I deem it of interest to enter into a critical comparison of their conclusions with our own.

The authors describe in the first part of the paper, various methods which they have used for bleaching and removing various anomalies of color of the teeth due to metallic stains, and of pulpless teeth. Coming closer to our problem these authors say: "Most brilliant results were obtained in teeth commonly called 'scritti' ('denti scritti—teeth written upon). (See Dental Cosmos July, 1916, page 785,) which present furrows or yellow striations alternate with lines of decalcified (?) enamel."

"The first case, a very fine one, referred to me by Chiavaro, was an individual who was going to the Polyclinic for the care of disease of the gums."

"It was believed that on account of the supposed congenital nature of the condition that it was impossible to whiten enamel of that sort. The young man V. of S., who was a native of Santa Maria, had teeth which presented mostly dark yellow lines, scattered with white opaque spots, which condition was common to all living in his neighborhood or district."

This would indicate that Santa Maria is an endemic district, in that a considerable number of its natives are constantly afflicted with this condition.

Figure 27.

Waco Case.

To resume: "I made the treatment (for removal) on the left side, so as better to be able to notice the progressive result. After fifteen treatments this part had acquired the normal color and translucency, making a most marked contrast with the untreated part. Such a result, with control by Chiavaro, and by many other professional men in Rome was noteworthy for me from the scientific point of view, especially in the disappearance of the white opaque spots,

which must therefore be altogether superficial."

In this respect and in this conclusion, Gasparrini is in precise accord with repeated experiments made by us, in that after removal of the superficial opaque layers of the enamel which carry the deposit of "brownin," normal enamel is found immediately underlying.

Indeed there is no question remaining at the present time but that the defective enamel is absolutely limited to the external layers of the teeth, except that as shown in Black's histological sections (Dental Cosmos Feb., 1916,) the defect may, at certain points, dip into the deeper layers of the enamel. Such spots would be invisible to the unaided eye, particularly in the presence of moisture.

To continue: "After numerous other experiments of this kind, which I carried on in the laboratory of Piergili and elsewhere, and which always confirmed the first result, the idea arose that a work should be undertaken to discover the origin of such anomalies, of which none up to this time, had given a convincing explanation, and which were considered generally to be of congenital origin."

Gasparrini then appends the following, by his collaborator, which deals more intimately with the problem.

"It is known that in some districts (or localities) the inhabitants almost without exception, have their teeth marked with yellow and white spots (denti scritti.)" "It was most common to see these teeth at Capua and at Naples before the water of the Serino was brought in."

It will be recalled that Dr. Eager, of U. S. Marine Hospital Service, noted this condition at and near Naples (Dental Cosmos, March, 1902,) as reported by me in Dental Cosmos (July, 1916, page 785) under the name "Chiaiae Teeth."

Associating this condition of the teeth in the Italian Investigation with a change in the water supply, is of intense interest to us, as we have noted frequently in what has been published previously that the occurrence of this lesion seemed to be so closely allied with a change in the water supply in different districts, notably at LaFayette and Walsenburg, Colorado, Franklin and Courtland, Va., and as reported in this article, in the artesian districts of South Dakota.

It is of interest to note also that the Italian investigation goes immediately to the water supply as the suspected origin of the trouble.

The Italian article we are reviewing, states also, in almost our own exact words, that "The discoloration presents itself everywhere in the same way, for which the cause must be identical." Continuing, the article says: "We made local observations at Campagnano at Rome, where the phenomenon is very marked. The first dentition of all the children of Campagnano takes place and maintains itself normally. The second teeth appear healthy, but suddenly lose their translucency and become of white opaque color. Successively corrosions, colored yellow, begin. Inhabitants who have gone away at the period of the second dentition, even if born at Campagnano, and of native parents, have normal teeth. On the other hand, those not native, and born of parents not native to Campagnano, but who have come to that district at the period of the second dentition, have teeth which are corroded and discolored."

This recital of conditions is remarkably similar to our own in describing the behavior of mottled enamel toward natives of the various endemic districts of America, and also toward those who altho not native to any of these districts, have grown the enamel of the permanent teeth therein, regardless of parentage and indeed of all other conditions except actual residence in such

districts. Gasparrini points out that the temporary teeth are always normal, but his statement that "the second teeth suddenly lose their translucency and become of white opaque color," can hardly be accepted as an accurate observation, for the reason that it is settled beyond any question of doubt in our experience, that the teeth erupt with the enamel of this typical opaque, white and mottled appearance with which he seems familiar.

My own observations have shown time without number, that exfoliation of temporary molars, after complete absorption of the roots, will show the occlusal surface of the oncoming bicuspid plainly visible and covered with this typical opaque white enamel. The same is true of erupting teeth in general among natives of afflicted districts.

With reference to the brown stain, I understand Gasparrini to mean that this discoloration, which the translator has termed "corrosion," makes its appearance after the eruption of the teeth, in which respect we are in entire harmony of understanding.

Continuing, he emphasizes his conclusion thus: "*These facts prove that the anomaly is not congenital, but is acquired in the period of second dentition.*"

Inasmuch as his conclusions, later shown, seem to mean that we should take the above quotation literally, I find myself in disharmony, to the extent that I would change the meaning to read: "but is acquired or brought about during the period of enamel development of the permanent teeth, and prior to their eruption," having reference strictly to the mottling of the enamel.

To continue: "Various hypotheses have been formed to explain the phenomenon, but two especially are worthy of discussion."

"1. Action of the air and the humidity."

"2. Action of drinking waters."

The first he discusses as entirely untenable, but considers the second at some length, from which I abstract the following:

"In favor of this theory it is a fact that in the first dentition, in which the child drinks milk, no anomaly takes place, but on the other hand, appears in the second dentition, that is to say, when a normal use is made of water."

It would seem to us that our author has missed the point. The true explanation of the immunity of the temporary teeth undoubtedly lies in the fact that their enamel is formed largely before birth, under conditions wherein the structural elements are presented after dialysis thru the placental membranes.

Coming now to a direct consideration of the drinking water:

"The waters of Anguillara, of Santa Maria and of Campagnano were analyzed, three districts in which the inhabitants are afflicted by this disease; but the qualitative chemical analysis did not give unusual results."

"The quantitative analysis however, showed a minimum content of mineral salts in general, but of salts of calcium in particular. They are therefore, waters relatively very pure."

"We now affirm that this minimum content of calcium salts is the cause of the phenomenon, altogether local, and due to the contact of the water with the teeth."

From the American viewpoint this theory that the lesion is due to a lack of calcium salts in the water, has a familiar sound, as this was the prevailing theory here before this investigation had collected its data.

It is unfortunate that these authors did not include their analyses in their paper, as a comparison with those made in the progress of our work would have been most interesting.

It is a fact that in the American endemic districts the waters have been

lacking in "mineral salts in general and in calcium salts in particular." Let us review some of the analyses published in our article in the dental Cosmos (May to August, 1916.)

The water of "L" with an endemic percentage of 88, has a total solid content of 57 plus, parts per million, with a calcium content of 5.7. This is a remarkably pure water, with a very low calcium content.

In contrast with this is the water at "V" with total solids at 1429. per million and calcium content of 90.

The endemic percentage of "V" is practically 100 and yet this water is certainly very high in mineral content, and carries fifteen times as much lime as that at "L."

As set forth in our previous article, as referred to, the conclusion is evident that judging the analyses at their face value, the solid content and the proportionate lime content of these waters were then considered to be absolutely contradictory as furnishing a reliable guide in determining the cause of this lesion. Our work along that line however, is by no means complete at the present time, so let us follow the Italian article further.

"Meanwhile we notice that the alteration of the enamel is superficial, as we have seen by our system of treating the teeth, which succeeds in eliminating the opaque white stratum, under which is found enamel translucent and normal. This demonstrates that the cause which produces this anomaly is external. If it were internal—if these waters acting on the organism—(hypothesis not to be excluded a priori) did not permit the complete calcifying of the enamel, all the underlying strata of the enamel would be abnormal, but the above mentioned experiments show that only the external stratum is changed."

"There remains then to explain the local action of these waters upon the teeth in the period of the second dentition. In favor of this local action the fact militates that the most affected are the superior incisors—the teeth most in contact with the water in drinking."

Gasparrini here attempts to set up the theory that the contact of certain waters against the labial surfaces of the upper central incisors produces this lesion. Does he have reference to the brown discoloration only, or to the mottled condition of the enamel? If the former, it is true that these surfaces are sometimes the only ones showing the stain, and usually the ones most marked, but what shall we say of those cases in which the entire denture, including the third molars, are stained almost a chocolate color, which have been seen in our experience?

Surely a water which was powerful enough to produce such a change by mere contact with, or laving of the teeth, would hardly have its action limited to or exhausted by so small an area of the denture, and surely so powerful a water would exert some similar influence upon the rest of the teeth.

If he ascribes the mottling of the enamel to the surface contact with these waters only, why would not such water attack the enamel of non-natives as well as natives and produce the same result? His explanation continues:

"But to make clear the chemical action which takes place, we must hark back to the origin of the salts of calcium in drinking waters taken from springs, as it is known these come from rain waters, lacking, as a rule, in mineral salts, but rich in carbonic anhydride. Crossing thru soil in which lime abounds (an unsoluble neutral carbonate of lime) they act slowly thru the following reaction:

$$CaCO_3 + CO_2 + H_2O = Ca(HCO_3)_2$$

Carbonata neutro di Calcio (insoluble) + Anidride carbonica + acqua equals Carbonato acido di Calcio (soluble)

"And so, the carbonate of calcium (insoluble) passes in solution under the form of bicarbonate (soluble.)"

"Naturally the tendency which rain water has to carry off lime in the form of bicarbonate, is all the greater, other conditions being equal, the less the quantity which it already contains in solution. A water very rich in salts of calcium will have therefore, a minimum tendency, or none at all, while a water with a small content of these salts will have to a very great degree, the property of absorbing it." (Lime.)

"Now the enamel of the teeth, which has a high content of salts of calcium, in contact with drinking water poor in these salts undergoes *superficially a decalcification,* and thence an alteration."

"To the question as to why these waters do not act on the teeth during any other period of life except only at the time of their eruption, we would answer, citing the following fact in nature."

"Building stones (travertino, marble, granite, etc.,) while in the quarry present very little resistance to the physical and chemical agencies; so much so that they are easily worked. Exposed for some time to the air, they acquire that resistance and specific hardness which is peculiar to them."

"The enamel of the teeth, by composition and inherent properties, is very similar to minerals. Given the great loss of water which enamel undergoes upon eruption and immediately afterward, this substance presents an analagous condition with the minerals above mentioned. With exposure to the air its specific resistance will increase, while after a short time the decalcifying action of these waters will become null."

Gasparrini's deductions seem anything but convincing to us.

To continue: "Thus the fact remains perfectly evident that nothing abnormal is noticed in the first dentition which takes place (erupts?) when the child drinks milk."

Concerning this question of the use of milk it will be recalled from my previous article that the Pima Indian children, in whom this enamel lesion is universally prevalent, have no facilities for the use of milk, nor do they use any, and it must be a fact that water is drunk during early childhood, yet the temporary teeth are normal, but the permanent teeth very badly marked.

Resuming: "We will explain how these waters do not produce any harmful effects upon the teeth of the second dentition when contact is lacking during the first period of their eruption." (I assume G. means to explain the failure of these waters to act upon teeth which have already erupted.)

"Just as the upper incisors are for a longer time and more completely immersed in the water when the glass is carried to the mouth, they are the ones most affected or altered."

"The phenomenon of 'denti scritti' (literally "teeth written upon"—meaning irregularly stained or striated) is rarely produced by spring water, because in the ground, lime abounds and the rain water crossing over and thru diverse soils could scarcely succeed in remaining relatively poor in salts of calcium. It is more frequent in those who drink cistern water."

Much could be said in answer to these arguments, but I will call attention briefly to certain points only. One of the most localized endemic spots with which our investigation has dealt, is the Sigle Ranch in Colorado, and here the water has been derived from a spring of unexcelled purity and low total solid content. This paper reports certain Islands in the Bahama group, as being endemic, and we found that the source of water was shallow wells. These Islands are coral reefs, in other words, solid calcareous material. What shall we say of rain water with reference to its lime content after running over and thru such a soil?

As to cistern water, it has never been our experience in a large and exceedingly diverse territory examined during the investigation, to find any association of this lesion with cistern water.

Were we to pursue our critical analysis of the Italian investigation further, additional contradictory evidence, particularly regarding water conditions and contents, could be produced, but it seems to us that our author's conception of this lesion and its production is faulty in its first fundamental, and we cannot understand how they, with their dental collaborators, have evidently failed to notice that teeth which have mottled enamel, erupt with the enamel in this condition, which means that this is brought about during the developmental period, and before the enamel could possibly have been in contact with any water which passed thru the mouth during the act of drinking.

We feel, as we always have, that the damage is wrought by some influence which acts either in an inhibitory or in a destructive way upon the enamel during or immediately after the building period, and reiterate that the condition is established prior to eruption.

However, since this study of these authors is the only other study similar to our own that we know of, it is received with great interest and as entirely worthy of such analysis as we have given to it. Their article closes with an announcement that "The phenomenon of corrosions with dark yellow discolorations, which manifest themselves after decalcification will be the subject of another paper at an early date"—and we sincerely hope that the same may be brought to our attention.

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Editorial Department.

THE MEMORIAL TO G. V. BLACK.

There are several features of especial interest connected with the memorial to Dr. Black, the unveiling of which is to take place at the meeting of the National Dental Association in August. First was the spontaneity of response on the part of the profession when an appeal was made to raise funds for this purpose. From every section of this country as well as from foreign lands the contributions came freely and whole-heartedly, illustrating in a very tangible manner the affectionate

regard in which Dr. Black was held by the profession generally. This was doubly demonstrated by the representative character of the contributors. The appeal which went out from the Memorial Committee stated that the object was not to have a few large contributions but to have many small ones, and as a consequence the list of contributors was a very extensive one, representing as it did the entire better element of the profession. This introduced a sentiment into the affair which could have developed in no other way, and which made a larger number of men directly interested in it.

Another fortunate feature in connection with the ceremonies of unveiling is the fact that they come at the time when the National Dental Association is holding its meeting in the city where Dr. Black lived during the later years of his life, and where his college teaching was done. While his reputation was co-extensive with the practice of dentistry thruout the civilized world, yet it is safe to say that his closest and dearest friends were numbered among those with whom he associated most intimately in the city of his residence. It is therefore quite befitting that this tribute to his memory should take place at a time when so large and representative a number of the profession are assembled in Chicago.

Not only this, but a matter of the very greatest congratulation to all concerned is the location of the site for the monument. Of all the places that appealed most to the Memorial Committee, as well as to the relatives of Dr. Black, Lincoln Park stood out in bold relief. No other spot seemed quite so appropriate as this. It was a place of which Dr. Black was particularly fond, and near which he lived in the early days of his residence in Chicago. It was also not far from the upper end of the Park where he had his last residence, and all in all, the associations which surrounded Lincoln Park made it the most suitable setting for his monument.

But early in the history of the movement the intimation came to the committee that it was next to impossible to locate any more monuments in Lincoln Park. Applications by the score were constantly being made to the Park Commissioners for the admission of monuments, and all were being rejected. Obviously there were limitations to the capacity of the park so far as monument space was concerned, and no blame could be attached to the Commissioners for the stand they had taken. But be it said to the everlasting honor of every member of the Board, as soon as it was made clear to them just what Dr. Black had stood for in the world of dentistry they unanimously voted to accept his monument in the Park and to assign to it such location as should be selected by the Memorial Committee in consultation with the Superintendent and the landscape architect of the Park, and the sculptor who

had the contract for making the monument. In fact the attitude of the Lincoln Park Commissioners in this important matter was such as to elicit respect for the breadth of vision and the high-mindedness of the personnel of the Board. Not one of these men had known Dr. Black but they all recognized the fact that he was the great examplar of a leading profession, and they were accordingly willing to pay tribute to his memory. This action of the Park Commission will not soon be forgotten by dentists everywhere. In thus honoring the memory of Dr. Black, they have paid a tribute to the calling which he so worthily represented, and the members of that calling will never cease to be grateful to them. It is an honor to the whole profession to have one of their members represented in so beautiful and historic a spot as Lincoln Park, side by side with the monuments of the heroic Grant, the immortal Lincoln, and others of the World's greatest and best. This tribute to dentistry will place our profession under lasting obligation to the splendid body of men who today sit in judgment over the destinies of Lincoln Park, and as the official organ of the representative Dental Association of the United States, we wish to place on record our appreciation and thanks. Pilgrimages will come from all parts of the civilized world to pay tribute to the memory of Dr. Black, and all will admire the beautiful surroundings in which his memorial is placed. Not one will go away without carrying in his heart the deepest gratitude to the men who made such a worthy environment possible.

SERUM, ANTITOXIN, VACCINE, VIRUS.

The four words—serum, antitoxin, vaccine, virus,—appear frequently in the literature of medicine and dentistry. They have been used more or less as synonyms, and without due differentiation of the meaning of each as compared with the others. While all carry the general idea of prevention or limitation of infectious disease, each has quite a distinct meaning.

Vaccine and serum therapy have today a prominent place, perhaps the first place, in every man's mind, whether he is a layman or in the profession. Because of this, of the high hopes attached to their use, and ignorance of the principles involved, many unnecessary and discouraging failures are being encountered. This is unfortunate because it tends to discount their value. The basic principles involved are comparatively simple and depend entirely on the effort either to transfer the immunity or resistance to an infection or disease from one individual to another; or to increase the immunity or resistance of the latter by greatly forcing the production of appropriate anti-bodies, a type of speeding-up of output.

Serums are invariably the medium employed to transfer the immunity of an animal or an individual to the person whom it is desired to protect or to cure. They are invariably the blood of animals or individuals purified, refined, and often concentrated—so as to bring to the patient a sterile, potent, and safe preparation. They may be injected subcutaneously, intramuscularly, or intravenously. This whole process is purely a passive affair, and as it consists of the injection of foreign proteid matter into the circulation of the individual injected, a transient affair; because with the early destruction of these proteins the increased resistance is gone.

These serums contain various classes of products. There are a few bacteria, such as those of diphtheria and tetanus that produce water soluble poisons or toxins that are carried from the part invaded all over the body in the blood and lymph. The nature and action of these poisons is not different from the poisons of venomous snakes and insects, or from certain vegetable poisons. Naturally antidotes are called for, and there is an appropriate antidote or antitoxin for each of these. Such serums are produced by injecting gradually increasing doses of the poison into animals until the maximum tolerance is reached. To be effective such an antidote must be used before the poison or toxin is attached or fixed to the cells of the vital organs, as the heart or brain. It neutralizes this toxin in the body or in the test tube, but it cannot repair the damage already done if used after the toxin has attacked the body cells.

Unfortunately in only a few cases are the bacterial poisons water soluble. Most of them are only freed by the destruction and digestion of the bodies of the bacteria, and the damage done is purely local, the point being to kill and destroy the bacteria so as to prevent their spreading to other parts of the body. The serums other than the antitoxins aim to mobilize the destructive solvent agents of the blood of the immune animal or individual and transfer them to the site of action in the injected individual. Here they act by agglutinating, dissolving, killing, or enabling appropriate body cells to engulf the invading bacteria.

Both of the above processes are suited to the treatment of disease or to the prophylaxis if the time during which protection is required is short. An entirely different process is involved where the individual is injected either with the dead bacteria, or with living organisms in small numbers or in slightly virulent forms. By vaccines are meant the killed bacteria. A virus is a living organism used for inoculation. The situation is further complicated by the confusing use of the phrase **vaccine virus describing the virus** for the production of cow-pox to protect against small-pox.

By injecting dead bacteria or the living organisms it is possible to stimulate the production of appropriate anti-bodies—and to use a mili-

tary phrase—it is a "preparedness" proposition and the result a large enough standing army of anti-bodies ready for, and strong enough to repel any ordinary bacterial attack. It is self evident this must be a slow process; its practice has yielded brilliant results in prophylaxis, as in typhoid fever and small-pox control, but in the treatment of actual infections it is very disappointing to clinicians.

Vaccines made from the organism actually producing the lesion (autogenous vaccines) are thought to have greater value than the so-called stock vaccines, because the anti-bodies called out seem to have a specific action, if any at all. Recently it has been shown that the injection of the proteids from milk, white of an egg, or from bacteria entirely foreign to the process, if in amounts to produce a violent reaction, has curative powers. This seems to be inherent in the severity of the reaction, the very high temperature or some other feature bringing about the result.

Certain individuals are very susceptible to the injection of foreign proteids or to second injections. This reaction is quite different from the reaction mentioned in the preceding paragraph and has to do with the rapid disposal of the foreign proteid and the rapid formation of toxic products which may produce a very serious collapse and even death. This is known as anaphylaxis or anaphylactic shock.

THE CANADIAN DENTAL ASSOCIATION IN CHICAGO.

This is surely a novelty. It is truly a jolt to our former notions of a national meeting. A Canadian national meeting held in a foreign country! Even the legislative body, the Dominion Dental Council, will hold its meeting in Chicago.

How did it happen? At the dental teachers' meeting in Pittsburgh a group of members were talking about where the next meeting would be held. Dr. Hoff joined the group and said, "Where will the next meeting be?" Dean Webster said, in a joking way, "In Ann Arbor." Dr. Hoff thought the group was talking about the next meeting of the Canadian Dental Association, while as a matter of fact it was talking about the teachers' meeting. Dean Hipple, of Omaha, overheard what was said, and immediately consulted the Secretary of the National Dental Association, who was near by, suggesting that the Canadians should be invited to meet with the National Dental Association as an indication of the close relations between two allied countries. As soon as the Secretary returned to Chicago, he consulted Colonel Logan, the President of the National Dental Association, and the invitation came into the hands of the Canadian Dental Association in a few days.

The Canadians are to be the guests of the National Dental Association. Accommodation will be provided in which to hold its special meetings. The Canadians will have the honor of putting on one of the General Session Programs and providing ten selected clinics. It is a great responsibility to provide this important session and the clinics.

The intention of the executive of the C. D. A. is to provide two essayists of world-wide distinction in war prosthesis. These men will present the results of their experience in now almost four years of war. It is hoped that they may have sufficient leave of absence to give some time to teach a little of this important work to the civil profession in Canada before they return. Steps have already been taken to secure leave for these men.

At the recent Ontario meeting the Society appointed a committee to assist in every way possible those who wished to avail themselves of the advantages of the greatest dental meeting ever held in America. Canadians who have not attended the National meeting of recent years have no conception of the magnitude of the affair; nor have they any idea of the unlimited opportunity for advancement in every department of dentistry. Our judgment is that there will be more Canadian dentists in Chicago August 5th to 9th than ever attended a meeting of the Canadian Dental Association before.

Is it an indication of the times or an indication of the bigness of our confreres to the south of us to open their doors in such a magnanimous fashion? Dentistry is no longer national, even in its legislative aspects; it is world-wide in all its aims and aspirations. It is hoped that the President of the C. D. A. may succeed in having a representative of the greatest ally of them all, France, at the meeting. To this end he has approached our Government and that of France. France sent Dr. Carrel to the last National meeting, and Canada hopes to have the honor of presenting another great Frenchman at this meeting.—*Editorial Dominion Dental Journal.*

YOU CAN HELP WIN THE WAR!—AN APPEAL FOR PROMPT INDIVIDUAL SERVICE BY EVERY MEMBER.

The conduct of the war and, in fact, the very future of America, are dependent not only upon the election of a war Congress that will enact necessary laws, but upon the presence in the National Legislature of men of vision, ability and broad experience, who are the best qualified of our citizenship to correctly solve the great internal and international questions which will come before the next Congress.

The National Security League, pursuant to unanimous action of its

executive committee, has taken upon itself the grave duty of impressing these matters upon you and asking you to pledge your service for prompt action to prevent disaster which might follow the election of incompetent or disloyal men to Congress. This can be prevented thru definite and concerted action on the part of loyal citizens who are in the vast majority. Neglect and indifference may prove fatal.

The remedy is for everyone to assume the personal obligation of speaking with, or writing without delay to political leaders, newspaper men and others who form public opinion in their Congressional Districts. Make them realize sharply that the need of the nation is the election of men of absolute and unconditional loyalty who are determined to prosecute the war to victory and who possess the strength of character and unquestioned ability to be of real service to the country in this crisis. The problems before the nation are such as to try the very souls of the best men that we can elect.

The people of your district will undoubtedly take the right stand if awakened to the political situation in time to secure the highest type of candidates to vote for in the primaries. **Every citizen can directly influence results to that end, and we earnestly hope that you will recognize the responsibility of so doing.**

This appeal is being sent to prominent persons generally thruout the United States and has no relation to the merits or demerits of any particular Representative, nor is it a criticism of the present Congress, which has done loyal and patriotic work. We will be very glad to learn from you your view of the situation and whether you will enter upon the work with enthusiasm. We will take pleasure in forwarding to you additional copies of this letter for distribution if you desire the same.—*National Security League Bulletin.*

Army and Navy

THE DENTAL CORPS—OUR RESPONSIBILITY.

By Dr. E. P. R. Ryan, New York.

Every nation engaged in this war has recognized the importance and indispensibility of Dentistry.

Thus after eighteen years of arduous efforts by the various Legislative Committees, seeking the enactment of a law recognizing our profession in the Army and Navy, the reward came last year in the passage of the present dental law. We are justly proud of those men who were alive to the exigency of the moment and carried thru Congress the measure, placing Dentistry on an efficient and dignified basis.

The war has created our opportunity, we have been granted our requests and the profession must and will "Earn its spurs."

This is the day of criticism, destructive and constructive, of almost every branch of our government, that is connected in any manner in the conduct of the war, and, unfortunately, the Dental Corps has not escaped.

The Dental profession eagerly rallied to the support of the legislative measures, but since that time too few of us have considered that any further interest or effort on our part was necessary. We expected the men who went directly into the Corps to meet all the demands made upon them and the profession as a whole. Many rumblings of criticism have been heard, some sincere and much political. The writer wishes to state that he is not conversant upon or inclined in any way to discuss the political phase of the question.

Having spent six years as an officer of the Regular Army Dental Corps and viewing the problem at present, as a civilian practitioner, several facts have been brought forcibly, to my mind which it is believed might be worth recording at this time.

The Dental Corps was better able to execute their duties with the increase in number and rank, but new demands were made and a task assigned to them that to most of us was inconceivable in its size, scope and importance. The writer has had the opportunity, unofficially, to keep informed thru various members of the Corps, Regular and Reserve officers, and he has also pursued the published orders relating to the work of the corps.

A full conception, however, could not be had until a very recent visit to one of the largest cantonments, where he had the privilege of reading a paper to the members of the Dental Corps and was given an opportunity to visit and inspect every branch and feature of the wonderful work the men are doing.

As a profession we shall not cease to honor or undervalue the efforts and labor of the men who were instrumental in securing the passage of the present dental law. However, appreciation of the work and accomplishments of those who

took up the reins of organization and execution of this great Dental Department, must now enter for proper consideration. Few men realize what the Regular Army Dental Equipment consisted of at the time of our entry into this great war. The officers who have been in the service for years, hoping and trusting that the time would come when they could give the fighting man the service he deserved, when modern equipment would be a reality and their services to their profession and to humanity would be raised to the proper plane, deserve great credit for the masterful manner in which they have met the new and gigantic situation.

The demands of the war fell suddenly, demands in terms great or even greater than on some other branches of the army, who are at present offering for excuses of delay the fact that specialists had to be trained to meet the new requirements.

From a Corps of about 100 our organization increased to approximately 3,000 members. The Dental profession has met and is meeting this demand. True, there is some room for criticism and not every member who has been accepted is of the proper calibre, but such a large proposition is bound to carry with it some grave blunders. The high standard maintained by the Dental Corps in the past, is sufficient to assure us that the unfit and inefficient will be eliminated in proper time.

The old supply table of the Dental Corps, frequently revised, was obsolete in many articles and there was not on hand sufficient supplies to equip 10% of this increased number. The dental supply houses were swamped by the large orders. Many startling things were found, viz: the great supply of forceps used in the United States that were made in Germany. It was difficult to get steel and the orders were far in excess of the stock on hand and possible immediate supply. Yet the men in charge of the Corps made no excuses that they could not execute their plans because of this condition. They rose gloriously to the situation and it is gladdening to the heart to see the wonderful results they have obtained.

The new equipment of the Dental offices is just as modern and completely supplied as any city office demands. It was a very gratifying view to stand at the door of a specially built infirmary and look down a long line of uniform Dental outfits, each fully equipped and manned by a busy and earnest Dental Surgeon. I dare say few men in private practice for so many hours a day are any more thoroly absorbed in their work and inbued with a spirit of accomplishment. These men are preparing fighters who are going into the trenches and they want their teeth to functionate in comfort and to eliminate possible pain and systemic infection that might arise without this service.

Some criticism has been expressed that the men are too young and without experience. The writer agrees that many older and experienced men are needed but the requirements of the service demands youth, this is a war where young men are playing the star parts.

The report that needless extractions are being made and that this class of service predominates was conclusively proven to be groundless by the writer's examination of the teeth extracted and observation of the method and care used in Root Canal work and fillings. The soldiers having necrosed and useless roots are compelled to have them extracted. Many of these men object to this and probably in a peevish mood give utterance to the unjust criticism that the Army Dentists resort to "wholesale" extraction of teeth. The officers of the Dental Corps are not trying to please the individual soldier, they are working for efficiency. There is not a demand for Quantity without Quality, by the Dental Surgeons in charge.

The Dental Ambulances are a huge help to the Corps as they can be run into

some section of the camp, in which there is no provision for a Dental office and they are extremely efficient, however, they may be somewhat limited in their usefulness in France, by virtue of the fact, that they are bulky and will make dangerous targets. They are monuments, however, to the men who devise them. Their equipment and supplies are absolutely complete, each having its own electricity, gas and water supply.

The greatest need that can be supplied at present to the Dental Corps, however, is a method of transportation. The Red Cross has donated many Dodge and Ford cars to the Division Chief Surgeons. The dental officers have no means of transportation assigned to them and the Camps in some cases are 15 square miles. There are dental offices in each regimental headquarters and the officers must either borrow a side car or walk, going to and from their quarters. The Chief Dental Surgeon must visit all of these offices daily. The Government will furnish a driver, gasoline and up-keep, but there is no money available to purchase either an automobile or a side car for the Dental Corps. It would be very greatly appreciated if the smaller societies thruout the United States presented to the Dental Corps of each division either a small touring car or a side car motorcycle.

There are many things yet to be accomplished by the men in charge of the Corps and possibly one of the most important is the adjustment of the unfortunate condition, arising from the fact, that the Dental Corps, by error has been left off the Table of Organization. There is no provision as to where they belong in the division and this, of course, makes the question of quarters and messes rather awkward. This will soon be adjusted as will most of the things that have a tendency to create criticism. We must have confidence, we must believe in the men who are so ably representing our profession and if you have any message that will help in their work, volunteer to go to the camps and give it to members of the Corps. Let us not help them to the brink and push them off into the sea with the word "swim," we still have a responsibility to these men. Let them know in any manner possible that we are supporting them and that we appreciate their service to our profession and our country. Many of them have given up all they possessed and liberty in the Army today is not the dominant feature. These men are military Dentists and their lives are different than the free, civil practitioner's life. They are subject to all the strict military orders and restriction and we owe them every encouragement and assistance in our power to give. If you have any doubts as to what the men directing and executing your Corps are doing, any doubts as to the service your boy in the ranks is receiving, any doubts as to the reputation your profession will have after the war, go and visit a camp.

It will send you away with your head high in the air, your heart bursting with pride, at your profession's showing and optimism as to the outcome of the war will be intensified and your loyalty raised to fever heat.

HEARING OF SECRETARY DANIELS.

The Secretary of the Navy was before the House naval committee on June 3 for a hearing with reference to the Senate amendments to the naval appropriation bill.

He stated that many of the amendments are not approved by him and did not originate in his office.

He referred to the provisions relating to the dental corps; the appointment of a permanent and temporary major general in the Marine Corps, and increasing the present rank of the heads of staff departments of the Marine Corps; and allowing men above the rank of major in the staff of the Marine corps to go into the line.

Surgeon General Braisted stated the proposed dental legislation was in pretty

fair shape and was satisfactory to everyone interested.

Secretary Daniels and Surgeon General Braisted preferred the bill introduced by Senator Tillman, which was drawn up by representatives of the bureau of medicines and surgery, the judge advocate general, and the bureau of navigation.—*—Army and Navy Register, June 8.*

ENOUGH ARMY DENTISTS.

The dental requirements of an army of more than 5,000,000 men can now be met by the present force of the dental corps of the American Army. Examinations for dental officers have been closed, and no further additions will be made to the corps for at least six months. At the time the United States declared a state of war to exist between this country and Germany the total number of dental officers was 58. The present force numbers 5,810. Commissions were offered to 5,467 dentists in all parts of the country, and all but 271 were accepted, a percentage of 95.1. A school for dental instruction has been started at Fort Oglethorpe, Ga. Eighty-five dental officers are assigned each month to take the two months' course. The first month is given over to 180 hours of general military instruction and training and the second to 70 hours' special military training and 100 hours devoted to professional subjects that have a definite relation to general practice of dentistry as it should be conducted in the Army. Special dental infirmaries have been established in the camps and cantonments in this country to which every newly inducted soldier is sent for examination shortly after arrival in camp. In those cases where men need attention it is given. The average number of tooth fillings is from 225,000 to 250,000 a month. This figure does not include the examinations, treatments, extraction, or crown, bridge, and plate work. The practice followed in the camps is to first give treatment to those cases that require immediate attention. Special attention is paid in determining the number of chronic infections associated with teeth. It has been found that a number of diseases incapacitating men for military service are traceable to chronic infections about the teeth. Dental inspectors are constantly visiting camps and cantonments to inspect work done by the camp dentists in order to determine if the dental officers are competent, are correctly assigned, and to report on the general efficiency of the units. The same thoro care that is given to the men in this country is also given to the men in France. With each base, general or evacuation hospital there is attached a specialist in plastic surgery to correct deformities to face and jaws. Dental surgeons who have been specially trained in this class of work are also assigned to such hospitals.—*Army and Navy Register, June 22.*

GENERAL GORGAS AND THE SURGEON GENERALCY.

The candidacy of Dr. Franklin H. Martin, major in the medical reserve corps and chairman of the general medical board of the Council of National Defense, for appointment as surgeon general of the Army as the successor of General Gorgas on the latter's retirement for age in October appears to have diminished, with the expectation entertained that General Gorgas will succeed himself. General Gorgas will have the unqualified indorsement of the American Medical Association at its annual convention next week in Chicago, and it is considered that his appointment now rests with himself—that is to say, if he desires to continue on active duty he will be retained as the head of the Army medical department. It is a question, however, whether he can be re-detailed as surgeon general of the Army, to which office he would not be eligible as a retired officer, and the law provides that there shall be a sur-

geon general. The difficulty can be overcome, it is believed, by appointing another officer, one on the active list, as surgeon general, assign him to some other duty, as in the case of the quartermaster general and chief of ordnance, and then designate General Gorgas as "acting" surgeon general. — *Army and Navy Register, June 8.*

DENTAL CORPS ORDERS FROM WAR DEPARTMENT.

DENTAL CORPS.

Maj. Richard B. Clark to Louisville, Ky., Camp Zachary Taylor, for temporary duty in the base hospital.

—*Army and Navy Register, May 18.*

The following to Fort Oglethorpe for course of instruction and return to their stations: Lieut. Cols. Harold O. Scott and Frank P. Stone.

1st Lieut Robert L. Strickland from Fort Oglethorpe, Ga., to Garden City, N. Y., aeronautical general supply depot, for duty.

1st Lieut. Arthur T. Burchill from duty at Fort Oglethorpe to Charlotte, N. C., Camp Greene, for duty with 3d motor mechanics regiment.

1st Lieut. James B. Manning from Fort Oglethorpe to West Point, Miss., aviation camp for duty.

1st Lieut. Campbell H. Glascock from Fort Oglethorpe to duty at signal corps aviation mechanics' training school, Minneapolis, Minn.

1st Lieut. James A. Curtis, jr., from Fort Oglethorpe to Camp Greene, N. C., for temporary duty in base hospital.

1st Lieut. Neil J. McCollum from Fort Oglethorpe to Camp Greene, N. C., for duty with 4th motor mechanic regiment.

1st Lieut. William H. Hoblitzell from Fort Oglethorpe to Camp Devens, Mass., for duty.

The following from duty at Fort Oglethorpe to Waco, Tex., aviation mobilization camp, for duty: 1st Lieuts. Lewis W. Maly, William F. Scheumann, and William B. Stewart.

—*Army and Navy Register, May 25.*

The following from his present duties at camps specified and report there for duty as camp dental surgeon: Col. Alden Carpenter, Camp Travis, Texas; Col. Frank W. Wolven, Camp Lewis, Wash.; Lieut. Col. Minot E. Scott, Camp McClellan, Ala.; Maj. John L. Shock, Camp Devens, Mass.; Lieut. Col. Wm. A. Squires, Camp Sheridan, Ala.; Maj. Benjamin C. Warfield, Camp Custer, Mich.

—*Army and Navy Register, June 8.*

Col. Fanklin F. Wing from present duties at headquarters, Western Department, and to duty as Western Department dental surgeon.

Major Bruce H. Roberts from duty at Columbus Barracks, Fort Sam Houston, for duty with evacuation hospital 17.

1st Lieut. Roy C. Starr from duty at Camp Dix, N. J., to Deming, N. M., Camp Cody, for duty.

1st Lieut. Earp T. Dickman honorably discharged.

—*Army and Navy Register, June 22.*

DENTAL RESERVE CORPS.

The following appointments in Dental Reserve Corps announced: To be captains: 1st Lieuts. Fred C. Allender, Isaac H. Archer, Egbert E. Baker, Francis A. Boylan, Roscoe Bristow, Carver R. Brown, Rex P. W. Capwell, Wm. Z. Carroll, Owen L. Chestnutt, Edward E. Courtright, George N. Frost, Robert L. Hart, Roy Hudson, Richard C. Kibler, Paul K. McGee, Leon M. Muedeking, Edwin J. T. Simon, Wm. L. Smith, Clarence M. Van De Water, George S. F. Waldo, Clarke B. Weeks, Joseph P. Werrick, Odon J. Wilda and Alex. J. Zimmer.

—*Army and Navy Register, May 18.*

The following appointments in dental reserve corps announced: To be captains, 1st Lieuts. James E. Bailey, Wm. J. Barto, Howard Bock, Joseph L. Brown, Roy D. Gabbert, Joseph W. Golding, Henry L. Grant, Howard A. Hale, Jay M. Hisey, John O. Lessig, Clayton A. Patterson, Charles P. Shewey and Charles W. A. Spies, dental reserve corps.

Capt. Harry M. Trafford to Montgomery, Ala., Camp Sheridan, for duty in base hospital.

Capt. Max C. Frazier to Washington for duty in Army dispensary.

The following appointments announced:

To be captains: 1st Lieuts, Ralph Burkhart, Samuel B. Ginsberg, Guy R. Harrison, Leonard J. Heiman, Clarence B. Laffin, Cameron E. Lane, Jay H. Lee, John S. Owens, William E. Paul, Merton M. Postle, James H. Stacey, LeRoy Tilestón, George E. Walker, and Raymond LeR. White.

—*Army and Navy Register, May 25,*

Appointment of 1st Lieut. Harry A. Tuckey to captain announced.

The following appointments in dental reserve corps announced: To be Major—Capt. Max C. Frazier. To be Captains—1st Lieuts. James T. Conner, Harry B. Riley, Leo B. Muzzy and Howard R. Dingler.

—*Army and Navy Register, June 8.*

Maj. Joseph A. Boarts to Columbia, S. C., Camp Jackson, for duty with evacuation hospital 14.

Maj. John McD. Eveleth to Camp Greene, N. C., for duty with Base Hospital 54.

The appointment of Capt. Richard C. Kiebler, dental reserve corps, to major, dental reserve corps, announced.

—*Army and Navy Register, June 22.*

Preparedness League

June 5, 1918.

Dear Editor:

I am enclosing herewith copy of the report prepared by Major Heckard up to May 1, 1918. This will give each state director an opportunity to see just what has been done in his state up to May 1st.

The grand total for the United States is 236,115 operations. This is a fine showing, but we are going to make it 1,000,000 operations.

Don't criticise the states that have a small number of operations reported. Their required quota may not have been as big as yours and then, too, some states have only recently got started. Just watch the reports from now on and see them grow.

In a few days we will send you a report of the work done to June 1st, and thereafter each month. There's a big surprise coming in that June report.

The dental profession is going on record. Our part in winning the war is to make our boys dentally fit. Let's push that 1,000,000 operations "over the top." See if you cannot do two things: First, secure 100% of the dentists in your state as members of the League; and Second, secure the co-operation of members to send in reports. Application blanks in any desired quantity will be forwarded to you upon request.

The enclosed report is nothing like as large as it would have been if a Form 3C Card had been returned to our Headquarters at 50 East 42d Street, New York City, for every operation. Unfortunately, many men do not see the necessity of making these reports and I feel sure that at least 150,000 operations have been performed of which we have no record. If, therefore, you want your state to make as good a showing as possible, it is essential that you impress upon all members of the League in your state thru your country directors the necessity for returning a Form 3C card to our Headquarters for every operation performed.

With the German U-Boats at our very doors let our profession give its answer—More sacrifice for ourselves—More help for our boys.

Major Heckard, who has been so untiring in his devotion to the work of the League, will leave our Headquarters on June 11th, and proceed to Fort Oglethorpe to prepare himself for special services in another field of activity in the Dental Reserve Corps. His loss to the League will be greatly felt by everyone, particularly at Headquarters, and I am sure the best wishes of all our directors will follow him in his new field of action. We need your co-operation more than ever and bespeak for his successor when appointed the same hearty co-operation which has been accorded Major Heckard.

CHAS. F. ASH,
Director General for the United States.

PREPAREDNESS LEAGUE OF AMERICAN DENTISTS.

REVISED REPORT, MAY 1, 1918.

	Men Examined	Men Worked for Cards	Filling	Extractions	Plates	Crowns	Crowns and Bridges	Bridges	Prophylaxis	Teeth Treated	Miscellaneous	Total Operations
Alabama	79	68	62	101	2	....	....	....	39	....	.....	204
Arkansas	326	248	1078	256	....	7	....	....	242	9	.....	1592
Arizona	295	234	444	125	2	3	....	1	120	....	.....	695
California	1323	1299	2902	1061	4	15	....	8	634	21	2	4647
Colorado	55	53	156	30	....	1	....	1	33	6	.....	227
Connecticut	1298	1221	3285	1014	8	21	....	11	477	9	9	4834
Delaware	56	55	230	52	....	1	....	1	9	....	.....	293
District of Columbia	97	96	212	32	....	2	....	1	45	4	2	298
Florida	30	30	62	43	....	1	....	....	10	1	.....	117
Georgia	421	347	634	295	....	5	....	....	174	1	.....	1109
Idaho	5	5	20	2	....	....	....	....	4	....	.....	26
Illinois	140	138	339	233	5	10	4	6	62	5	.....	664
Indiana	2251	1999	4959	1183	4	18	....	2	531	18	2	6717
Iowa	1985	1930	4731	916	7	69	....	28	1189	57	1	6998
Kansas	208	194	466	128	3	10	....	5	109	4	.....	725
Kentucky	328	319	705	221	....	8	....	3	133	3	.....	1073
Louisiana	3	3	22	....	....	....	....	1	1	....	.....	24
Maine	242	193	722	172	2	1	....	1	63	4	.....	965
Maryland	1868	1239	2913	1134	2	40	....	3	273	17	.....	4382
Massachusetts	3176	2768	7167	2521	11	43	....	34	1237	33	2	11048
Michigan	299	289	1028	314	5	16	....	5	181	12	2	1563
Minnesota	839	804	1779	747	2	18	....	13	376	17	.....	2952
Mississippi	26	26	33	36	....	....	....	....	14	9	.....	92
Missouri	220	217	613	146	....	8	....	3	109	2	.....	881
Montana	275	271	559	381	5	2	....	2	156	9	.....	1114
Nebraska	774	684	1656	414	3	20	....	2	358	20	.....	2473
Nevada	14	14	31	22	....	....	....	....	4	....	.....	57
New Hampshire	281	278	1174	296	2	19	....	8	143	9	.....	1651
New Jersey	39	39	75	107	6	1	....	6	10	....	.....	205
New York	10815	10692	20661	14584	62	75	....	94	2500	267	27	38270
North Carolina	147	146	472	150	....	3	....	....	43	....	.....	668
North Dakota	1316	1302	3302	833	2	18	....	5	547	21	9	4737
Ohio	3009	2877	7545	2385	16	96	....	20	1583	46	2	11693
Oklahoma	834	814	1520	392	1	25	....	4	536	23	3	2504
Oregon	221	205	854	141	....	4	....	10	136	10	.....	1155
Pennsylvania	4235	3671	11694	2955	25	50	....	19	1123	45	.....	15911
Rhode Island	1108	1017	2587	738	3	11	....	11	406	6	1	3763
South Carolina	3	3	2	2	....	....	....	....	3	....	.....	7
South Dakota	42	41	111	51	....	2	....	....	22	....	.....	186
Tennessee	808	783	1664	588	2	4	....	1	526	12	1	2798
Texas	1143	1091	1801	733	....	9	....	3	720	9	2	3277
Utah	456	321	867	176	2	16	....	13	159	14	.....	1247
Vermont	474	457	1457	300	3	6	....	....	186	3	2	1957
Virginia	200	150	430	155	....	....	....	3	64	....	.....	652
Washington	8	8	26	6	....	2	....	....	....	....	.....	34
West Virginia	105	103	316	91	1	2	....	....	25	9	.....	444
Wisconsin	118	115	378	120	1	6	....	2	65	8	.....	580
Wyoming	50	44	69	55	....	1	....	....	16	1	.....	145
Totals	42045	38841	93813	36437	191	672	4	330	15396	744	67	147654
Exhibit No. 2—Dental Colleges Previously Reported	5081	.....	10034	4397	105	68	95	29	2945	1676	71	19433
Exhibit No. 3—Estimate of State Directors in Previous Reports.	9801	.....	11734	6405	204	597	....	325	1139	297	48327	69028
Grand Total, May 1, 1918..	56027	38841	115581	47239	500	1337	99	694	19480	2720	48465	236115

PREPAREDNESS LEAGUE OF AMERICAN DENTISTS.

REPORT JUNE 1st, 1918.

STATES	Men Examined	Men Worked for "Cards"	Fillings	Extractions	Plates	Crowns	Crowns and Bridges	Bridges	Prophylaxis	Teeth Treated	Miscellaneous	Total Operations	Previously Reported	Grand Total
Alabama	92	88	159	62	....	....	....	....	69	2	....	292	204	496
Alaska	6	5	14	19	....	....	....	....	....	1	....	34	....	34
Arkansas	338	301	638	112	3	5	1	....	188	8	....	955	695	1650
Arizona	245	201	435	147	4	9	1	3	110	3	....	712	1592	2304
California	238	234	681	184	1	10	....	8	167	8	....	1059	4647	5706
Colorado	261	178	422	78	....	7	....	2	122	2	1	634	227	861
Connecticut	1092	969	2459	865	5	17	1	10	458	10	1	3826	4834	8660
Delaware	10	10	39	12	....	....	....	....	1	....	....	52	293	345
District of Columbia	32	32	78	23	2	1	....	1	30	4	....	139	298	437
Florida	....	....	....	....	....	....	....	....	....	....	....	....	117	117
Georgia	360	336	730	291	....	3	....	6	179	6	....	1215	1109	2324
Idaho	4	4	10	5	....	....	....	....	2	....	....	17	26	43
Illinois	177	170	495	176	4	11	5	2	69	3	....	765	664	1429
Indiana	961	844	2153	454	....	16	12	2	367	12	1	3017	6717	9734
Iowa	1372	1266	3057	635	6	17	1	8	826	25	1	4576	6998	11574
Kansas	487	439	1041	188	1	16	....	3	293	....	....	1542	725	2267
Kentucky	1123	1001	2112	490	....	30	1	4	744	22	....	3403	1073	4476
Louisiana	69	68	145	94	....	3	....	1	26	29	1	299	24	323
Maine	459	430	1555	306	....	11	1	1	223	5	....	2102	965	3067
Maryland	749	518	1175	437	3	14	....	....	111	2	....	1742	4382	6124
Massachusetts	1660	1329	3858	1289	10	50	....	14	566	29	....	5816	11048	16864
Michigan	315	305	952	309	6	23	3	2	155	9	2	1461	1563	3024
Minnesota	2034	1772	3615	1478	7	21	2	3	1056	37	....	6219	2952	9171
Mississippi	51	47	180	29	1	1	....	....	20	1	1	233	92	325
Missouri	301	285	775	135	3	10	....	1	143	3	....	1070	881	1951
Montana	60	59	136	55	....	2	2	....	22	1	....	218	1114	1332
Nebraska	456	424	899	309	....	11	....	3	251	11	....	1484	2473	3957
Nevada	8	8	24	6	....	....	....	....	4	6	....	40	57	97
New Hampshire	308	250	761	213	....	10	1	....	124	5	....	1114	1651	2765
New Jersey	16	14	3	18	....	....	....	....	3	1	....	25	205	230
New Mexico	5	5	15	2	....	....	....	....	1	....	....	18	....	18
New York	3831	3609	7186	4295	33	55	15	17	1668	54	17	13340	38270	51610
North Carolina	65	63	192	91	....	....	....	....	30	1	....	314	668	982
North Dakota	123	117	290	115	....	12	....	....	77	....	....	494	4737	5231
Ohio	3094	2869	8136	2274	10	139	....	43	1597	56	11	12274	11693	23967
Oklahoma	1149	982	1705	503	....	28	1	1	668	21	....	2927	2504	3431
Oregon	214	200	701	112	1	17	....	7	109	2	1	950	1155	3105
Pennsylvania	2482	2237	7024	1669	7	76	11	16	822	23	1	9649	15911	25560
Rhode Island	557	468	1051	373	1	4	....	1	224	7	....	1666	3763	5429
South Carolina	236	230	636	108	....	5	....	....	118	3	....	870	7	877
South Dakota	105	97	187	67	1	6	1	....	57	2	1	322	186	508
Tennessee	1761	1626	3699	931	1	18	2	6	1193	25	3	5878	2798	8676
Texas	859	748	1284	332	3	10	....	1	485	7	2	2124	3277	5401
Utah	123	96	301	86	....	19	1	1	44	1	....	453	1247	1700
Vermont	171	160	540	116	....	5	3	2	87	....	....	753	1957	2710
Virginia	337	214	544	172	....	1	....	1	82	1	....	801	652	1453
Washington	4	4	20	....	2	2	1	....	....	....	....	25	34	59
West Virginia	97	94	297	65	3	2	....	....	39	5	....	411	444	855
Wisconsin	221	199	668	164	2	6	....	3	108	1	1	953	580	1533
Wyoming	4	4	12	8	....	....	....	....	2	....	....	22	145	167
States Total	27020	24213	63089	19912	128	703	66	178	15730	429	70	98305	.....	.....
Dental Colleges	571	571	1923	96	2	....	....	13	461	16	....	2511	.....	.....
Previously Reported	56927	38841	115581	47239	500	1237	99	694	19480	2720	48465	236115	.....	.....
Grand Total	84518	63625	180593	67247	630	2040	165	885	33671	3165	48535	336931	.....	336931

Signed: W. A. HECKARD, Major D. R. C.

PREPAREDNESS LEAGUE OF AMERICAN DENTISTS.

FILED VOUCHERS RECEIVED FROM DENTAL COLLEGES.

MAY 1, 1918.

DENTAL COLLEGES	Examinations	Fillings	Extractions	Prophylaxis	Bridges	Crowns	Crowns and Bridges	Plates	Miscellaneous	Treatments and Roots Filled	Number of Operations
Marquette University, Wisconsin	150	468	105	150	....	....	....	15	....	....	738
Tulane University, Louisiana	....	244	64	....	....	....	4	8	....	64	384
Louisville College, Kentucky	20	....	....	....	....	....	....	....	20	....	20
University of Louisiana	42	170	52	39	8	14	....	1	....	27	311
N. Y. Coll. Dent.	1021	958	699	720	3	3	16	5	41	322	2738
Loyola University, New Orleans	12	....	6	12	....	....	....	....	....	14	542
University of Pennsylvania	623	330	100	78	....	....	....	....	....	34	542
Ohio College of Dental Surgery	52	105	27	30	....	....	11	....	....	15	188
Tufts Dental School, Massachusetts	235	655	186	69	....	....	3	4	....	208	1125
George Washington University, D. C.	115	85	56	18	....	....	20	8	....	12	199
University of Maryland	18	28	10	9	....	....	8	2	....	....	57
Philadelphia Dental College	8	20	10	6	....	....	....	....	....	16	52
Washington University, St. Louis	493	540	51	145	....	....	....	....	....	27	763
College of Dental and Oral Surgery	....	630	131	120	2	3	....	1	....	40	927
Ohio State University	....	1871	639	521	....	....	9	15	....	543	3598
St. Louis Dental College	522	753	162	236	4	6	....	17	....	62	1240
University of Minnesota	350	200	1000	300	2	....	....	....	....	155	1657
Vanderbilt University, Tennessee	....	15	20	10	....	....	....	2	....	....	47
Cincinnati College of Dentistry	50	100	79	90	....	8	....	11	....	40	328
Creighton University, Nebraska	12	12	....	8	2	2	....	2	3	9	38
Howard University, D. C.	....	....	....	15	....	....	....	....	....	....	15
University of Michigan	83	349	22	19	....	....	1	....	....	....	391
University of Illinois	15	40	30	15	....	....	....	....	....	....	85
Chicago College of Dental Surgery	136	126	211	88	6	14	....	6	....	40	491
Western Res. University Dental School	30	35	30	18	....	....	13	....	....	3	99
Indiana Dental School	36	50	35	18	....	....	....	....	....	....	103
University Southern California	144	169	126	68	3	5	....	1	7	46	425
University Pittsburgh	12	88	14	10	....	....	....	....	....	1	113
Indiana State Dental Association	701	1356	297	25	....	1	....	....	....	1	1680
Dental Infirmary, College of Jersey City	201	553	230	108	....	12	10	2	....	....	915
Baltimore College of Dental Surgery	....	84	35	....	9	....	....	4	....	....	132
Totals	5081	10034	4397	2945	39	68	95	105	71	1679	19433

3-C CARDS RECEIVED FROM MAY 1st TO MAY 31st, 1918.

Wednesday, May 1	1066	Friday, May 17	675
Thursday, May 2	766	Saturday, May 18	664
Friday May 3	761	Monday, May 20	1159
Saturday, May 4	1092	Tuesday, May 21	838
Monday, May 6	1470	Wednesday, May 22	1219
Tuesday, May 7	568	Thursday, May 23	1452
Wednesday, May 8	594	Friday, May 24	1712
Thursday, May 9	621	Saturday, May 25	1850
Friday, May 10	533	Monday, May 27	2989
Saturday, May 11	590	Tuesday, May 28	1296
Monday, May 13	977	Wednesday, May 29	2295
Tuesday, May 14	700	Friday, May 31	1210
Wednesday, May 15	687	Total	28,599
Thursday, May 16	815		

W. A. HECKARD, Major, D. R. C.

PREPAREDNESS LEAGUE OF AMERICAN DENTISTS.

REVISED REPORT, MAY 1, 1918.

ESTIMATES OF STATE DIRECTORS INCLUDED IN PREVIOUS REPORTS FROM WHICH HAVE BEEN SUBTRACTED THE ACTUAL VOUCHERS, ALSO RECEIVED FROM STATE DIRECTORS, BUT NOW CONTAINED IN EXHIBIT I OF THIS REPORT.

	Examinations	Fillings	Extractions	Plates	Crowns	Crowns and Bridges	Bridges	Prophylaxis	Teeth Treated	Miscellaneous	Number of Operations
Colorado	....	18	1	....	....	....	....	1	6	.....	26
Connecticut	2805	1748	774	....	....	....	....	201	....	61	2784
Delaware	312	794	547	6	18	....	45	151	....	1	1562
Kentucky	....	474	97	....	....	....	....	30	42	.....	643
Maine	173	2140	372	1	1	....	....	233	147	.....	2894
Maryland	....	54	....	....	....	....	....	....	....	.....	54
Massachusetts*	....	....	....	....	....	....	....	....	....	40000	40000
New Hampshire	1800	900	3600	100	200	....	75	....	....	.....	4875
New Jersey†	1653	.....	....	....	....	....	....	....	....	8265	8265
Illinois	6	36	....	....	....	....	....	2	2	.....	40
Pennsylvania	782	2161	....	75	333	....	200	134	....	.....	2903
Rhode Island	1789	1160	283	....	44	....	1	387	....	.....	1875
South Dakota	....	650	450	....	....	....	....	....	....	.....	1100
Vermont	337	1116	197	4	1	....	4	....	....	.....	1322
West Virginia	144	583	84	18	....	....	....	....	....	.....	685
	9801	11734	6405	204	597	....	325	1139	297	48327	69028

*Unclassified operations reported by Dr. Carl R. Lindstrom, Director of Massachusetts.

†Averaged 5 to a man as report is very incomplete, but would probably amount to a great many more operations.

PREPAREDNESS LEAGUE OF AMERICAN DENTISTS.

NOTES AND NEWS.

Communication from President Beach.

The Third Annual Meeting of the League will take place in conjunction with the meeting of the National Dental Association on August 7th, 1918.

We are preparing a program of unusual merit and, on account of the great work which has been done by the League durin the past year, a general report will be given which will cover the several activities we are engaged in.

Addresses will be made by prominent men on subjects appropriate to the occasion and during the sessions of the Convention, meetings of State Directors and general workers for the League will be held for the purposes of instruction and stimulation of interest.

What the Public Should Know.

Many drafted men apply to the dentist with the idea that the Government is paying for our services and that they have a right to demand expensive bridgework and other attention without limit. This has come about because of the semi-military procedure of sending the notices on cards franked by the War Department. Considerable embarrassment at times, has been caused the dentist and all local workers are justified in using legitimate

means to acquaint the public of this misconception. It is also most essential that the public understand that all service given in the name of the League must be absolutely free. Accepting the smallest compensation aborts the spirit of the League and cannot be justified.

Our members have been asked to give each drafted man one hour of free service and whatever one chooses to give beyond that, the League is, of course, glad to receive. If it is deemed unwise to give additional service without fee, the patient should be discharged as having received that which is due him from the League, or advised to appeal to League Headquarters for assignment for further attention.

League Buttons.

We again urge all members to wear the League button as an indication that they are actively engaged in preparing our drafted men for service. Those not having the button may secure one by sending twenty-five cents to the Treasurer, Dr. L. M. Waugh, 576 Fifth Ave., New York, N. Y.

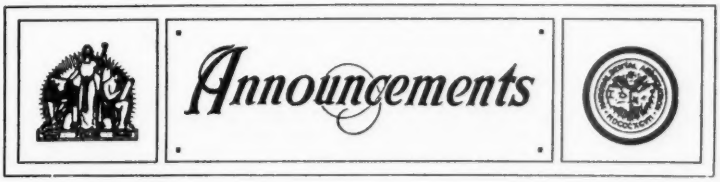
The League Study Course.

The League study course is designed for the mature practitioner to prepare him to give adequate service to our soldiers who have been injured in battle. Many thousands will return needing our best care, therefore, it is our duty and privilege to give every assistance possible in this direction. The course will be practical in character and approved by our best authorities. Information may be obtained by addressing the office of the President, 131 Allen St., Buffalo, N. Y.

Lantern Slides.

The League has prepared 25 sets of slides which have been distributed to the different State Directors to be used by Sectional Units and Dental Societies in general. The public also may find much of interest in viewing these pictures. Each set is practically divided into two parts, one set arranged by Major Heckard, comprising nearly 90 slides and traces the plans and development of the great work of caring for the drafted men. The evolution of the different form cards together with their application is graphically depicted and is of especial benefit to Directors and members of the League generally. Every District Director should show these slides to his workers.

The second set of about 35 slides was arranged by J. W. Beach and aside from conveying general information of the League and its work, gives special emphasis to the wonderful Dental Motor Car of the League in a series of most interesting pictures. These are available thru the State Directors. There is a lecture synopsis form accompanying each set of slides. J. W. BEACH.



NATIONAL SOCIETIES.

National Dental Association, Chicago, Aug. 5-6-7-8 and 9.

National Association of Dental Faculties, Chicago, Congress Hotel, Green Room, Aug. 2-3, 1918.

National Association of Dental Examiners, Chicago, 1918.

Xi Psi Phi Fraternity, Chicago, 1918.

Delta Sigma Delta Fraternity—Aug. 5, 1918, Chicago, Congress Hotel.

Psi Omega Fraternity National Alumni Chapter, Chicago, Aug. 5, 1918. Business session, 3 P. M., New Ball Room, Auditorium Hotel. Banquet, 7 P. M., Florentine Banquet Hall, Congress Hotel.

Association of Military Dental Surgeons, Chicago, August 7, 1918.

American Society of Orthodontists, Edgewater Beach Hotel, Chicago, Aug. 1-3, 1918.

National Association of Dental Examiners, August 5th and 6th, Auditorium Hotel.

STATE SOCIETIES.

November.

Arizona—November 15-16-17, Phoenix.

Washington, D. C.—Nov. 6, Chamber of Commerce, Washington, D. C.

District of Columbia—Nov. 20, Washington, D. C.

December.

Ohio—Dec. 3-5, Columbus.

Maryland—Dec. 15, Baltimore.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The next meeting of the National Association of Dental Examiners will be held in Chicago, Ill., August 5th and 6th at the Auditorium Hotel.

For further information address the secretary,

DR. J. A. WEST,
417 Utica Bldg., Des Moines, Ia.

XI PSI PHI FRATERNITY.

The National Alumni Association of the Xi Psi Phi Fraternity has established headquarters during the National Dental meeting at room No. 218, Auditorium Hotel.

The annual banquet will be held in the Crystal Ball Room of the Blackstone Hotel Monday August 5th, 7 P. M.

Members of the Xi Psi Phi Fraternity who expect to attend the banquet please communicate at once with Dr. H. B. Pinney, 25 E. Washington St., Chicago.

Yours very truly,
H. B. PINNEY.

THE AMERICAN ACADEMY OF ORAL PROPHYLAXIS AND PERIODONTOLOGY.

The next annual meeting of The American Academy of Oral Prophylaxis and Periodontology will be held in Chicago, August 2 and 3, 1918.

GRACE ROGERS SPALDING, Sec'y.,
803 Empire Bldg., Detroit, Mich.

MONTANA STATE DENTAL SOCIETY.

Montana State Dental Society will hold its fifteenth annual session at Butte, Montana, July 18, 19 and 20, 1918.

R. R. Johnson, Secretary.

PSI OMEGA FRATERNITY.

The National Alumni Chapter of the Psi Omega Fraternity has established headquarters during the National Dental meeting at Room 230, Auditorium Hotel.

The business session of the National Alumni Chapter will be held Monday, August 5th, at 3:00 p. m.

The Psi Omega banquet will be held in the Florentine Room of the Congress Hotel at 7:00 P. M., Monday, August 5th.

Psi Omegas who expect to attend the banquet should communicate at once with Dr. M. M. Printz, 4235 Lake Park Ave., Chicago.

NOTICE.

The Eighteenth annual meeting of the American Society of Orthodontists will be held August 1, 2 and 3, at the Edgewater Beach Hotel, Chicago, Ill.

This will be an excellent meeting.

It is advisable to make your reservations early.

F. M. CASTO, M. D., D. D. S.,
Secretary-Treasurer,
458 Rose Bldg., Cleveland, Ohio.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

Office of the President,
25 East Washington St.,
Chicago, Ill., June 26, 1918.

Dr. Otto U. King, Chicago.

Dear Dr. King: I am enclosing herewith copy of correction asked for by the University of Michigan to be published in the next issue of The Journal of the National Dental Association.

A Correction.

To be noted, and filed with the Annual Report of the National Association of Dental Examiners for 1917.

The error hereby to be corrected was in no sense the fault of the Tabulating Committee of the N. A. D. E., nor of the Tabulating Committee of the N. A. D. F. It was due entirely to an oversight and ill consideration by this Board of the conditions prevailing in connection with the illegal, and prematurely applied examination as given in Michigan in May, 1917.

We have submitted to the Chairman of the Tabulating Committee of the N. A. D. E., a correct, legal, and carefully prepared report covering the entire year's examinations.

Based upon this report, therefore, the first correction will be applied to page 93, Annual Report N. A. D. E. The University of Michigan College of Dental Surgery will have 3.8 per cent. of failures instead of 31.3 per cent. The same correction will be applied to page 95. On page 96, the Cumulative Results of Tabulations for the years 1910-11-12-13-14-15-16-17 will show the University of Michigan College of Dental Surgery having 3.3 per cent. instead of 7.7 per cent.

These percentages as corrected will be used in all future tabulations.

Respectfully submitted,

MICHIGAN STATE BOARD OF DENTAL EXAMINERS.

Dated April 15, 1918.

The above correction has been made and is hereby approved by the Tabulating Committee of the N. A. D. E.

T. A. BROADBENT, Chairman,
Tabulating Committee.

DENTISTS' MUTUAL PROTECTIVE ALLIANCE.

By M. D. K. Bremner, President, Chicago, Ill.

A very important decision was recently rendered by Judge F. A. Geiger, District Judge, Western Division of the Northern District of Illinois, against Dr. William H. Taggart in his suits against Dr. M. D. K. Bremner, and other dentists decreeing the patents on the process of making cast gold fillings invalid.

The case must now be carried to the United States Circuit Court of Appeals for a final decision. Such a decision will finally and conclusively settle the Taggart patents insofar as the seventh judicial circuit, including the states of Illinois, Indiana, and Wisconsin is concerned. It will not legally settle the status of the Taggart patents for any other circuits.

This is a very important decision in view of the many patents on processes and devices used in dentistry that are taken out every year. There are dozens of patents recorded in the Patent Office now and this decision against Taggart illustrates how a man may believe his patent is valid but when it is brought up for a judicial test it may be proven invalid.

The purpose of the Dentists' Mutual Protective Alliance is to defend its members in case of prosecution by the owner of a process patent. The men who formed the Alliance believe that patents in dentistry involving their manipulative skill should be submitted to judicial approval the same as are patents in every other art.

THE TAGGART CASE NOT SETTLED.

May 24, 1918.

Dear Doctor:—

The Taggart case is not settled—it must now be taken to the Court of Appeals before it will be finally decided. A decision in the Court of Appeals, how-

Boriclor Tooth Paste

BORICLOR tooth paste when properly applied, helps to reduced inflammation, stops the formation of pus, stimulates healthy granulation, induces the permanent closing of pockets and seldom fails to re-establish normal conditions. Flabby and congested gums harden and renewed vitality is impaired to all the tissues of the mouth.

Prescribe it in your first case and you will learn its true value.

Borine

A triumph of Modern Chemistry

The gums are nourished by the circulation of the blood at the roots of the teeth. Patients should massage the gums with BORICLOR Tooth Paste, polish the teeth with the BORINE Tooth Powder, rinse the mouth and throat with BORINE. This home treatment along with your work is all that is within your power to keep the circulation of the blood in the gums in the proper state and keep the mouth in a good healthy condition. It is your duty to teach the individual patient how to do his part at home to maintain a healthy mouth.

Samples on request, if you give the name of your druggist.

Prepared by

Borine Manufacturing Company

BORINE BUILDING

West 42nd Street New York City

ever, will not legally settle the case for districts outside of the seventh judicial circuit.

Dr. Taggart has prosecuted hundreds of dentists and his patents are still a threatening danger to you. And not only do Taggart patents endanger you, but there are dozens of other patents on methods and devices used in dentistry recorded in the Patent Office. Any of these patent owners may sue you on short notice.

If Taggart or any other owner of a patent sues you and you are not a member of the Alliance, you must then fight your case individually and alone. But when it is known you are a member of the Alliance, an owner of a Process Patent will be very careful before suing you, for in all the history of Process Patents there has never been a suit lost when handled by an organization for protection.

The Alliance now has a membership seven thousand, five hundred strong. Think what it means to you to have thousands of your fellow workers ready to support you when it comes your turn to be sued—protection for the small membership fee of ten dollars.

Delays are dangerous—several men in Chicago waited too long to "think it over" when Taggart's attorneys demanded a license fee. After suit was started against them, they were glad to settle for $250 and costs, instead of the $150 asked of them in the first letter.

Make sure that this does not happen to you. If you "think over" joining the Alliance too long you may lose your opportunity.

Very truly yours,

M. D. K. BREMNER,
President.

MILWAUKEE dental practice for sale—Practice go $6000 year. Price only $650. Low office rent and living rooms—if desired. Outfit invoice almost $1000. Address 1580, care F. V. Kniest, Bee Bldg., Omaha, Nebr.

CHICAGO COLLEGE OF DENTAL SURGERY

OFFERS

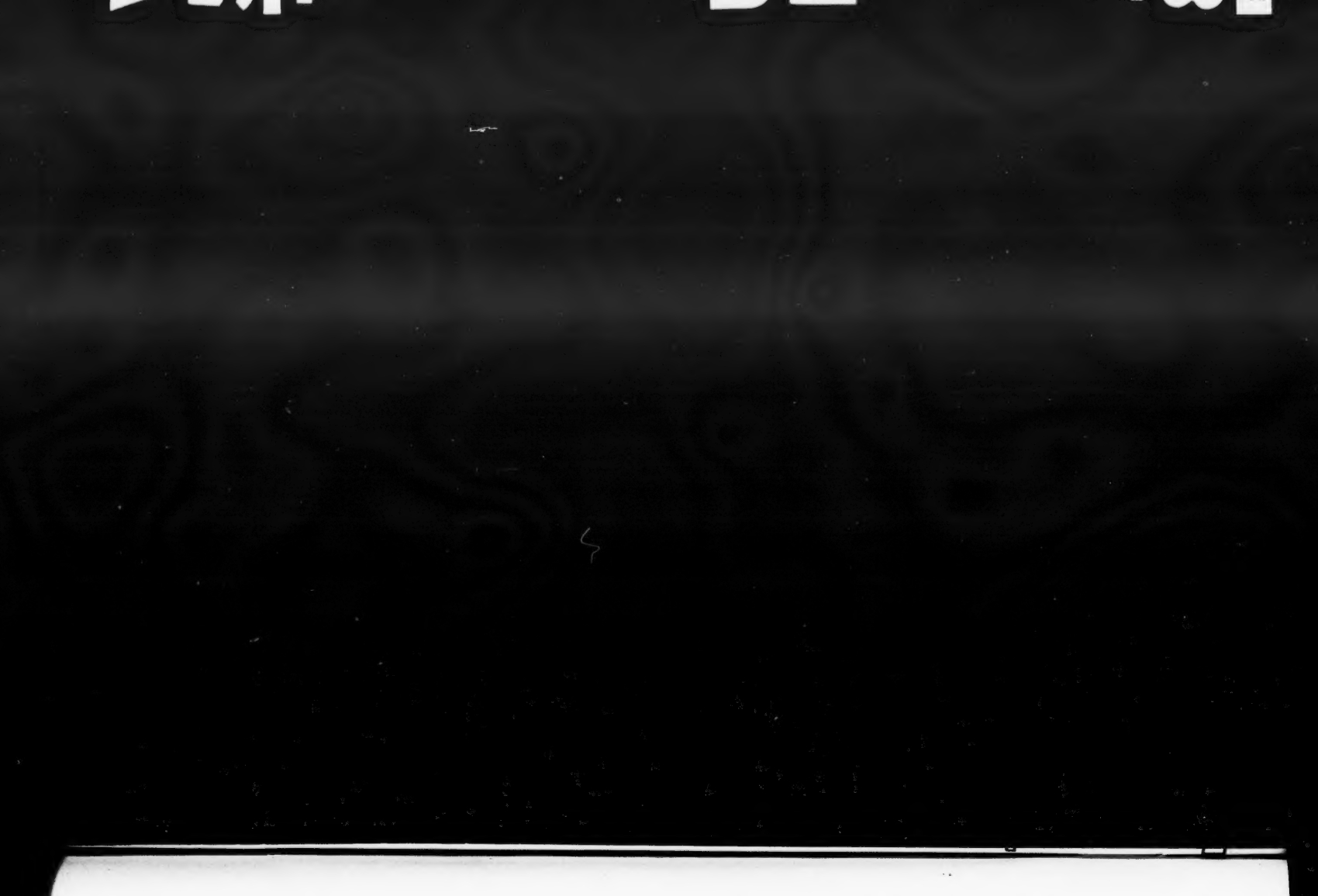
POST-GRADUATE COURSES

Under the personal direction of

Dr. Rupert E. Hall, in Artificial Denture Construction,

AND

Dr. Finis E. Roach, in Removable Appliances.

These courses begin July 29th and continue for one week. $50.00 for either course. Registrations will be limited. For information address

DR. CHARLES E. JONES, Registrar,
Chicago College of Dental Surgery, 1747 W. Harrison St.